An Essay on the Climate of Ireland. By JOSEPH M'SWEENY, M. D. *In answer to the question proposed by the Royal Irish Academy.*—"WHETHER WE HAVE REASON TO BELIEVE THAT A CHANGE HAS TAKEN PLACE IN THE CLIMATE OF IRELAND, AND IF SUCH CHANGE HAS OCCURRED, THROUGH WHAT PERIOD CAN WE TRACE IT, AND TO WHAT CAUSES SHOULD WE ASSIGN IT."

Read November 8th, 1830.

Sæpe etiam steriles incendere profuit agros
Atque levem stipulam crepitantibus urere flammis.

VIRGIL. GEOR. LIB. 1.

DIFFICULT would be the task of treating of the climate of Ireland at different periods, and of drawing conclusions from data so scanty as we possess, but that general considerations of the immutable laws of nature aid us in the investigation, and we derive no small assistance from the more accurate observations on the climate of England, where the history of the weather has been preserved with more care, than in Ireland; analogy in this case lends us its powerful aid.

The comparison of the nature of the vegetation in the island in ancient and modern times, and the comparison also of the animal kingdom at different periods, give us general views as to the climate. The clothing of the ancient inhabitants, the nature of their habitations, the casual allusions to the weather made by historians in describing sieges and battles; all these matters must engage the attention of the person, who undertakes to treat of the climate of Ireland at remote periods, when no regular accounts of the weather were kept to be handed down to posterity.

If a stranger were to direct his attention to the subject of the climate of Ireland, he would be led to suppose from the situation of the island in a temperate zone, and from its situation with respect to the vast Atlantic, to the vapours of which it must be exposed, that the climate ought to be mild and moist; but on ascertaining that the island contained no mountains of extraordinary height, and on tracing on the map the number of rivers by which it is intersected, and amongst them such a river as the

Shannon, and knowing the effect of insular situation on climate, he could have no doubt on the subject.

Mr. Daniel, in one of his meteorological essays, compares the Caspian sea, which has no outlet for the rivers which it receives, with the lakes of another continent, North America, which send an immense volume of water to the ocean; he considers them as hygrometers on a large scale, by which we may judge of the state of saturation of the two atmospheres. *In Ireland we have also a hygrometer on a large scale, we have the Shannon, an index of the large quantity of rain that annually falls.* The fact of this fine river being in so small an island, "spreading like a sea," as the poet Spencer described it, is alone quite sufficient to prove the great humidity of the climate of Ireland.

As the causes of climate here glanced at, are of a permanent nature, and as the laws of nature are immutable, it is just to suppose that mildness and humidity were the characteristics of this climate always, when compared with the climate of other countries of Europe. The effects of draining and cultivation on climate, have been noticed in every quarter of the globe; it would be strange if draining and cultivation, which have gone on rapidly with an increasing population in this island, have not produced some effect on its climate. We will have to investigate in the course of this essay, whether Ireland be an exception to a general rule in this particular. Before entering on the task of tracing the history of the climate, it may be right to make some observations on climate in general, and to examine the assertion so boldly made, that the climate of Europe has greatly changed since the time of the Roman dominion.

Our knowledge of different agents, such as heat, light, and electricity, is yet limited, their mode of operation is not sufficiently understood, to enable us to speak decidedly on several meteorological points. The nature of the sun itself is only surmised, the question of its being a habitable globe, surrounded by a phosphorescent atmosphere, or of its being a body of fire, is one that admits of discussion. Philosophers are undecided about the nature of the solar spots; the question of their producing any effects on the weather is yet involved in doubt.

To Franklin we are indebted for the knowledge of the agency of electricity in the clouds. Scheele pointed out the action of solar light in blackening the nitrate of silver, but to modern research we owe the knowledge of the connexion between light, heat, electricity, and magnetism. The curious effect produced by light on a mixture of chlorine and hydrogen, excited attention, and the discovery of the polarisation of light by Malus, directed the first philosophers of Europe to the subject of light. The action of the violet rays in exciting the magnetic influence, noticed by Morichini, and the connexion between electricity and magnetism, discovered by Œrsted, have opened a new field for inquiry, which has been cultivated with assiduity and success.

The connexion between heat, light, electricity, and magnetism, fortunately, is en-

gagirg the attention of the first philosophers of the day. According to Baumgartner of Vienna, Ann. de Chimie, 1826, the direct white light of the sun, may be made to produce magnetism more rapidly, than the process of Morichini, or of Mrs. Somerville. The researches of De La Rive, of Œrsted, and of Ampere, the creator of the branch of physics, called electro dynamics, and of Faraday, on the movements of continued rotation discovered by him ; and of Becquerel, and of other eminent philosophers, may help, when compared with the meteorological observations of such men as Humboldt, Daniel, Howard, and Flaugergues, to give insight into intricate points of meteorology. Much yet is to be done in the way of simultaneous observation, in different parts of the world, by philosophers capable of undertaking the task, and aided by the most *improved instruments*, before we will be warranted to speak dogmatically on several points.

A more intimate knowledge than we at present possess of the laws that govern light, heat, electricity, and magnetism, may be absolutely necessary for the explanation of several meteorological phenomena. It has been said that a second Newton is yet to come, whose comprehensive mind will be capable of arranging the multitude of facts and observations, and of deducing the general laws that govern climate. It is only necessary to study attentively, the most approved of works on meteorology, to know what little at present is understood, of the causes that make the winds to deviate at different times, and that influence temperature in different countries, and in different years.

The doctrine of central heat in our earth, has latterly been brought forward on the continent, to explain the difference of temperature in countries, where a similarity of temperature might be expected. The Neptunian theory of Werner, which had obtained ascendency in public opinion, cannot be well reconciled with the mass of evidence now before the scientific world, with regard to the increase of temperature, as we descend from the surface of the earth into mines. In the *Essai sur la temperature de l'interièur de la Terre, par M. Cordier*, will be found a deal of information on this curious subject.

If the opinion were admitted of our earth being a planet partially cooled, as Des Cartes, and Leibnitz supposed, and having its centre in a state of fluidity, there would still be a difficulty in reconciling the accounts of the very severe cold of Europe in former days, with its climate at present, and a cooling process constantly going on, by means of the conducting power of the crust of the earth.

Humboldt, perhaps the first opinion in the world on the subject of temperature, inclines to the belief of a central heat. After alluding to the observations of Arago on the temperature of water brought up from deep borings, he remarks, that these important observations show, that in the earliest state of our planet, tropical temperature, and tropical vegetation, could arise under every zone, and continue until the radiation of heat from the hardened surface of the earth, could cause it to cool. If

this be admitted, it follows as a consequence, that Ireland must have experienced, at one period, a climate of a high temperature. In Jameson's Edinburgh Philosophical Journal, for 1828, vol. xviii., an extract of a lecture on climate, delivered by Humboldt, is given, in which are to be found many valuable observations. He observes, that the time is passed, when persons were satisfied with some undefined views of the difference of climates, and when all the modifications of temperature were ascribed either to the shelter afforded by ridges of mountains, or to the various elevations of the earth. He remarks, that remarkable differences of climates are perceived in large tracts of country under the same latitude, and on the same level above the surface of the sea, which do not arise from the trifling influence of individual localities; but are subject to general laws determined by the form of the continents in general, by their outlines, by the state of their *surface*, but particularly by their respective positions, and the proportion of their size to the neighbouring seas. From the proportion of the size of Ireland to the vast Atlantic, no wonder that our winters should be mild, and that our summers should not be very warm.

The influence of the sea on climate is a matter that admits of no dispute; but other matters relating to temperature are involved in obscurity—for instance, the occasional visitation of very severe winters. Are the supporters of the doctrine of central heat, prepared to maintain, that its agency in some winters is less than in others? Cordier supposes the thickness of the crust of the earth to vary in different places, and explains on the principle of central heat, the difference of climate in countries in the same latitude. This curious subject is engaging the attention of the scientific world, but it must be acknowledged, that the occasional return of very severe winters, and of extremely hot summers, does not at present admit of any satisfactory explanation.

Many writers, by selecting from the works of the ancients, passages which treat of severe cold, have led to an almost general belief, that the climate of Europe has very much changed: but a person residing in a distant country would form a very erroneous notion of the climate of England, if he were only to read a number of accounts of the Thames having been frozen over at different times, and the extraordinary years are these that are most likely to be recorded. Doctor Patterson had the courage, in his work on the climate of Ireland, to deny the asserted change in the climate of Italy.

It is a matter of importance in this inquiry to investigate, if any change of consequence has taken place in the climate of the continent; if it could be shown that an important change has taken place there, it would be but reasonable to suppose a change also in the climate of Ireland. But let the climate of Europe in general be what it may, at any time, it may be safely asserted, that Ireland, from not having mountains of great height when compared with those of other countries from its insular situation in a temperate zone, from its being exposed to the vapours of the Atlantic, must from the most remote periods have possessed a climate, mild and moist, when compared with that of the rest of Europe.

A large work has been written by M. Schow, professor of Botany in the University of Copenhagen, which treats of the climate of the earth during the existence of man on its surface; it treats of the climate of the antediluvian world, as far as can be ascertained by fossils.

A paper by Professor Schow on the supposed changes in the meteorological constitution of the different parts of the earth, during the historical period, was read before the Royal Society of Copenhagen, and has been translated and published in the 8th volume of Brewster's Edinburgh Journal of Science. He investigates the accounts given by the ancients, of animals and plants in different countries. He observes that the most rigorous criticism is required in such an inquiry, that persons should not be led into error, as the ancients are not very careful in their description of plants and animals, and matters considered essential in determining the species, were unknown to them; besides, their descriptions are not free from fabulous admixtures. He remarks that great caution must be observed in drawing conclusions as to climate, from animals and plants; for instance, it is not a higher temperature which has driven the beaver from the greater part of Europe, and which in North America compels it, more and more, to retire into the interior, but an increasing population.

With respect to the cultivation of plants, it is not enough to know that a plant was not cultivated by the ancients, but it should be ascertained that they attempted its cultivation in vain.

With regard to the freezing of the sea, a great difference must be made between that which is usual, and that which is extraordinary; and great allowance must be made for the weakness of human memory, which recollects much better the remarkable exceptions than the general rule of things.

He begins the investigation with Palestine, on the authority of the Bible, and treats of the existence of the date tree, and of the vine, about which there can be no question in ancient or modern times. The date tree was abundant, and principally in the southern part of the country.

Jerico was noted for palm trees; the people had palm branches in their hands. Pliny mentions the palm tree as abounding in Judea. Tacitus and Josephus, speak of woods of palm, as well as Strabo, Diodorus Siculus, and Theophrastus.—Among the Hebrew coins, those with date trees are by no means rare, and the tree is recognised as it is figured with its fruit. The vine was one of the plants most cultivated in Palestine. In many places vineyards and wine are spoken of. Strabo and Diodorus speak of the cultivation of the vine in Palestine. Both dates and grapes, together, are symbols on Hebrew coins.

Professor Schow, argues—that as the date tree, in order to bring its fruit to perfection, required a mean temperature of 21° centigrade, that the country about Jerusalem could not have a lower mean temperature than 21° centigrade.

He observes, that in Barbary the vine succeeds only on the coast, and even there,

the north sides of the hills are chosen for its cultivation. The mean temperature of Algiers is 21° centigrade. In Egypt, the cultivation of the vine is insignificant; Cairo has a mean temperature of 22° centigrade. At Abusheer, in Persia, they are obliged to plant vines in ditches, to protect them from the heat of the sun.

From the successful cultivation of the date and vine in Palestine, its mean temperature could not have been above 22_0, probably not above 21° centigrade, and he concludes—"if there has been any difference between the mean temperature of Jerusalem, in ancient and modern times, it can hardly amount to one degree."

The time of harvest formerly in Palestine, compared with the time of harvest described by modern travellers, he shows, favours the same conclusions.

It follows from the observations of Theophrastus and Pliny, that as the olive tree was cultivated in Upper Egypt, the climate could not have been more warm, because the olive tree does not bear a great heat. Professor Schow thinks from comparing the accounts of the ancients with these of the French observers, that the rise of the Nile happens at the same period of the year as formerly, showing that the rainy season began in the tropical part of Africa at the same period that it does now.

The ancients spoke of the central part of Africa, as uninhabitable on account of the heat, but not from their own observation it is to be remarked.

From the careful study of the writings of the ancients, and from observation of the vegetation of Italy at the present day, he is against the idea of any change of consequence having taken place in the climate of Italy. He says that the passages of Virgil are taken from his description of pastoral life suited to the mountains, since in the lower plains, there is not sufficient grass on account of the heat. Myrtle and bay have grown near Rome since the earliest times; myrtle branches were made use of in the peace between the Romans and Sabines; and bay crowns were used in the time of their kings; he says that the climate could not be much colder, since myrtle and bay grew there.

That the climate of the south of Europe has not been more warm, is proved by the account which Theophrastus gives about the date tree in Persia, which, when brought to Greece, did not ripen the fruit. Schow carefully compares the times of the corn, and wine harvests, in ancient and modern times, and thinks that the climate of Greece and Italy, like that of Palestine and Egypt, has undergone no important change; but if on account of somewhat later harvests, and the possible growth of beech trees in the Roman plains, we might be led to the opinion, that formerly the climate had been a little colder than at present, the difference will hardly come up to one or two degrees, and will not be greater than might be occasioned by the improvement and cultivation of the north of Europe in modern times.

From Greece and Italy he passes to the countries on the Black and Caspian sea, here it has been pretended that the change of climate has been extraordinary. The Abbè Mann, who collected the accounts of the ancient writers, says that they concur

in asserting that the climate there was such as is now hardly to be found in Lapland or Siberia. At present there grow, according to the accounts of travellers, olive trees, fig trees, bay trees, and most of these which grow in the south of Europe. Schow maintains, that a severe criticism will do away with a deal of these pretended changes. Herodotus says, that the Bosphorus freezes, over which the Scythians led their armies, and their waggons. Strabo speaks of the freezing of the sound, and adds, that it was reported thet Neoptolemus fought a battle with cavalry in winter, where in summer he had engaged in a sea-fight.

But Pallas, who in modern times has described those regions, informs us that the Bosphorus, even in moderately severe winters, is covered with ice, principally drift ice from the river Don; and that in severe winters, loaded waggons are carried over it. It is thus at present as it was in former times. To these remarks, adduced by professor Schow, may be added the severity of the winter on the Danube, which interfered with the operations of the Russian army in the late war; and the London papers at the time, gave us accounts from Odessa, of the 3d of January, 1829, which stated, that the sea, as far as the eye could reach, was frozen, and that vessels were prevented from going out or coming in.

Schow enumerates the fruits of these regions, described by the ancients, to prove that no material change has taken place.

In treating of the climate of France, he observes, that we are informed by Strabo, that in Gallia Narbonnensis, the same fruits are found as in Italy, but that in going farther north, the olive tree, and fig tree disappear. In comparing Decandolle's map to his *Flore Française*, the limit assigned by Strabo holds good, and it proves that the climate had not been colder formerly.

The high authority of Professor Schow is here adduced, to prove that no change of great consequence has taken place in the climate of the continent of Europe, in the historical period; it is, therefore, just to suppose, that during the same time, no very great change has taken place in the climate of Ireland; but it is also reasonable to suppose, that it has been modified in some degree by draining and cultivation.

In endeavouring to arrive at general conclusions, with regard to the climate of Ireland by analogical reasoning, the subject of the climate of England naturally suggests itself, for our investigation. It may be right here not to confine our attention to the historical period, but to endeavour to obtain some idea of the nature of the climate of England in antediluvian times.

The fossil remains in England enable us to form an opinion on the subject; not only in England but even in the northern parts of Europe, the remains of animals have been found, which prove that at some remote period, animals existed there in great numbers, which are now only to be met with in warm regions. In different parts of Europe also have been found the impressions of plants, so well defined, that they are easily ascertained to have been the produce of a very warm climate. Im-

pressions of vegetables have been found in countries, the climate of which now could not produce such vegetable productions. It does not come within the plan of this Essay, to treat of the geological changes of our earth. A work has been written by Doctor Ure, of Glasgow, showing that the revolutions of our earth, and animated nature, can be reconciled to *modern science and sacred history.*

In this work he alludes to the futile attempts of Voltaire to explain the impressions of fishes, found on mountains. Doctor Ure, in the introduction to his work, truly observes: "As the stream of civilization advances towards the general diffusion of knowledge, truth, and piety, over the earth, new chambers of nature are unlocked, new scenes of instruction are disclosed, and new means and motives of intellectual and moral excellence, are presented to our view."

In treating of the subject of vegetation in Europe in antediluvian times, he observes: "There is no doubt, however, that palms with fan-shaped leaves, covered Europe with their lofty vegetation at this remote period, in regions where no species of these plants could now grow. The opinion of some writers that these vegetables may have been transported from remote climates into the places where they are actually deposited, appears at variance with every fact hitherto observed, and possesses in reality no solid foundation."—*Ure's Geol.* p. 452.

The fossil vegetables found at Newhaven, in England, agree with those found in the Paris basin; one was the fruit of the palm tree, an instance of the produce of a warm climate. In Doctor Ure's work on geology, there is given the figure of an impression of a vegetable in slate clay, from Lancashire, considered to be the production of a tropical climate.

At Kirkdale, have been discovered the remains of hyænas, and even of the hippopotamus, inhabitants of warm regions. Doctor Buckland in quoting Cuvier, to prove the dispersion of the remains of elephants over every country in Europe, combats the opinion, that the remains found in England, were of elephants imported by the Roman armies. He shows that the fossil elephant belongs to an extinct species of this genus. He observes, that the idea of their being drifted by the diluvian waters from the tropical regions must be abandoned, on the evidence afforded at the den of Kirkdale; and he adds, it remains only to admit that they must have inhabited the countries in which their bones are found.

If it be admitted, that the climate of England at any one period was capable of the growth of such vegetable productions as palms, and served as the abode of the elephant, hippopotamus, and hyæna, it follows as a natural consequence, that Ireland from its proximity, must have possessed somewhat of a similar climate at the same time. The evidence afforded by the den at Kirkdale, cannot be explained away. Doctor Ure remarks, that "there are few physical properties established on a larger or sounder induction than that the Kirkdale and Torquay caves having been dens occupied by hyænas in antediluvian times."—*Ure's Geol.* p. 574.

We shall now have to direct attention to the climate of England in the historical period. According to Doctor Halley, Cæsar landed in England in the latter end of August; an attempt has been made on this computation, to prove that the harvests were earlier at that time than at present, from a passage in his commentaries, where it is stated that the corn was all reaped except in one place. But by reading Cæsar attentively, it is easy to see that he alludes to the country near the camp, and that this sweeping conclusion cannot be admitted.

The Britons, who after the first battle had agreed to submit, no sooner learned that the Roman fleet had been damaged, than they resolved to break off negotiations, and to starve the Romans, "*frumento commeatuque nostros prohibere.*" They hoped by preventing the return of the Romans, that no one after, would attempt to pass into Britain for the purpose of waging war.

Under such circumstances, it is not to be supposed, that Cæsar would be very particular in waiting until the very last day for the ripening of the corn; on the contrary, he would be willing to lay his hands on any thing that might support his troops. "*At Cæsar etsi nondum eorum consilia cognoverat, tamen et ex eventu navium suarum, et ex eo quod obsides dare intermiserant, fore id quod accidit suspicabatur. Itaque ad omnes casus subsidia comparabat. Nam et frumentum ex agris quotidie in castra conferebat.*"

He also repaired his damaged fleet; and while these matters were going on, the soldiers stationed before the camp, informed him that an unusual dust was to be seen in the direction in which the legion had gone, which, according to custom, had been sent out to forage. He hastened to their assistance, and found them engaged with the Britons, who had formed an ambuscade for them in a place where the corn had remained uncut, and who attacked them while engaged in reaping—"*Nam quod omni, ex reliquis partibus demesso frumento pars una erat reliqua suspicati hostes huc nostros esse venturos.*" Surely it cannot be contended for with any reason, from this passage, that all the corn in Britain was reaped except in this place. The passage has reference only to the neighbourhood of the camp; all the corn on the ground within sight of the camp, was probably cut down by the Romans themselves, except in the spot where the ambuscade was laid for them: Cæsar informs us that they were daily employed about it. Its being not quite ripe would not prevent them, situated as they were; besides the number of days which elapsed from the time of their fleet being injured, until this engagement, is not mentioned.

We may infer from the dust seen from the camp, that the weather was at the time, dry. The account of the weather after the engagement, coincides with the variability of the climate of England in modern times—"*Secutæ sunt, continuos complures dies, tempestates quæ et nostros in castris continerent, et hostem a pugna prohiberent.*"

Thus this passage in the 4th Book of Cæsar, is far from proving that a change has taken place in the climate of England.

The general character which Cæsar gives of the climate of Britain, holds good to this day. He describes it as being more temperate than that of Gaul, the cold being less severe—

"Loca sunt temperatiora quam in Gallia remissioribus frigoribus."

Cæsar de Bello Gal. Lib. v.

The cold in the north of France in the winter, is much more severe than in England. Persons from England, who reside during the winter at Paris, are surprised at the cold of the weather.

Tacitus describes the British climate as foul, with frequent showers and clouds.

"Cœlum crebris imbribus ac nebulis fœdum, asperitas frigorum abest."

Vita Agricolæ.

This passage in Tacitus, is a difficulty not to be surmounted by those who maintain, that the great humidity of England is of recent origin.

The account which Tacitus gives us of the vegetation of Britain, answers perfectly at the present day.

"Solum præter oleam vitemque et cetera, calidioribus terris oriri sueta patiens frugum fecundum."

Vita Agricolæ.

If it should be maintained, that the climate of England at one period was well fitted for the cultivation of the vine, and for the production of wine; the supporters of this doctrine, to get rid of the quotation from Tacitus, ought to be able to prove that the climate ameliorated to the time of William of Malmesbury, and that subsequently it again grew cold.

It was probably a succession of favourable seasons that led the Romans to encourage attempts at cultivating the vine in Britain. Nothing was more likely to be fostered than the vine by religious establishments, after the introduction of Christianity.

Bede speaks of the vine growing in some places in England—

"Vineas quibusdam in locis."

The same may be said now.

Camden, speaking of Gloucestershire, says: "The west part beyond the Severn, is covered with woods. But I need not spend much time on this head, William of Malmesbury, will save me this trouble, who is lavish of his praises and description of this country; take, therefore, his words: 'The country is called from its principal city, the vale of Gloucester, productive throughout of corn and fruits, either by the sole bounty of nature or the industry of art, so that it invites the most indolent persons to labour, when the product will return a hundred fold; you may see the high roads bedecked with fruit trees not planted by art, but natives of the soil. The ground

spontaneously produces fruit in taste and colour far exceeding others, many of which will keep the year round, so as to serve their owners till others come in again. No county in England has more or richer vineyards, or which yield greater plenty of grapes, or of a more agreeable flavour. The wine has not a disagreeable sharpness to the taste, as it is little inferior to that of France in sweetness.'"

Camden comments on this passage thus: "What he says of the hundred-fold increase of the land, is a mistake. Not that I am of the opinion of those peevish lazy husbandmen, whom Columella complains of, that the soil is worn out and rendered barren by its excessive ancient plenty. But on this account, not to mention others, we need not wonder that so many places in this county were called vineyards from their vines, since wine was one of the productions of this county; and certainly it seems more owing to the indolence of the inhabitants than to the alteration of the climate, that it now yields none."—*Gough's Camden*, Vol. I. p. 379.

Here we have the opinion of Camden, that no alteration had taken place in the climate from the time of William of Malmesbury to his time; and the experience of latter days shows, that in favourable years, wine may be produced in England, which may be mistaken for continental wine by good judges, instead of being inferior, as William of Malmesbury described the wine in his time.

Mr. Williams,* who advocates the opinion of a change of climate, of course has not passed by the celebrated passage in Malmesbury; he thinks with Camden on the subject of the hundred-fold produce from the land, that the learned monk may have drawn rather too flattering a picture; if so, it can be immediately retorted, that the learned monk may have also drawn too flattering a picture of the fruit trees and vineyards.

The archives of the Church of Ely, give us positive information of the making of wine from a vineyard for some years, and we learn that in an unfavourable year no wine but verjuice was made.

Speechly, in his treatise on the culture of the vine, mentions a controversy between the Rev. Mr. Pegg, and another, on the subject of vineyards in England, formerly. The Rev. Mr. Pegg, after stating the evidence, observes, that it appears plainly, that at Ely grapes would sometimes ripen, and the convent made wine of them, and sometimes not, and then they were converted into verjuice.

Speechly gives an account of many successful attempts at raising vines in England, for the purpose of making wine at subsequent periods. He describes the vineyards at Pain's Hill, which belonged to the Hon. Charles Hamilton. This gentleman produced wine, which was supposed by good judges, to be superior to any champagne they ever drank, and which was sold for fifty guineas a hogshead; one merchant purchased £500 worth.—*Speechly on the Vine*, p. 213, 3d edition.

* Williams on the Climate of Great Britain, p. 125.

Speechly says : " From the foregoing accounts it is evident, that good wine may be made in this country in a propitious season." There can be little doubt but that the opinion of Speechly would have been verified, with great profit to any individual, so fortunate as to possess a vineyard, in a favourable soil in England in the year 1826. But where the seasons are so uncertain, such a speculation would be hazardous indeed. Evelyn, in 1655, writes thus : " I went to see Colonel Blount's subterranean warren, and drank of the wine of his vineyard, which was good for little." Phillips in his Pomarium Britannicum, has the following very sensible remark on the subject of English wine. " We may conclude that as our intercourse increased with the continent, it was found more advantageous to import wine, than to depend on the product of our own crop, which must have been an uncertain one from the variableness of our climate."

When the English army assembled at York in the year 1327, to repel an invasion of the Scots, Froissart informs us that " good wines from Gascony, Alsace, and the Rhine, were in abundance, and reasonable."—*Froissart's Chronicles, by Johnes*, Vol. I. p. 55.

The fact of wines from such distant places being conveyed to the centre of England, and sold at reasonable prices there, proves that the climate then was not suited to the cultivation of the vine.

The statement of the production of wine in England at a distant period, can be met by similar statements in modern times, and the description of the vale of Gloucester, by Malmesbury, bears with it the marks of being an exaggerated statement.

Where the climate is so variable, it would not be an easy matter to attempt to draw precise conclusions by means of a calendar of Flora ; in some years vegetation is more forward than in others ; and it has been remarked by close observers, that after a succession of favourable years, many plants acquire, as if by habit, the power of blossoming somewhat earlier for some time.

Lord Bacon, in his celebrated essays, gives us an account of gardening, and of the time several plants come into flower, near London ; probably the description was drawn up from the state of the gardens in the year the essay was written ; we shall compare some of his accounts with those of modern times.

" There followeth for the latter part of January and February, the mezereon tree which then blossoms."—*Bacon.*

" The mezereon sometimes blossoms as early as the end of January or beginning of February."—*Phillips's Sylva Florifera.*

" For March there come violets."—*Bacon.*

" Violet—This favourite flower is a native of Europe, flowering in March and April."—*Miller's Gardener's Dictionary by Martyn.*

"In April—the wall flower."—*Bacon.*	Wild wall flower, "its bright golden flowers are very ornamental in April and May."—*Sowerby's English Botany.*
In April, the cowslip."—*Bacon.*	Cowslip—April is commonly assigned as the month of flowering for all; but the primrose appears in March, and the cowslip in April."—*Miller's Dictionary by Martyn.*
"In May and June, apple tree in blossom."—*Bacon.*	"When about the end of May it is covered with bloom, few if any shrubs surpass the crab in beauty."—*Sowerby's English Botany.*
"In July—the lime tree in blossom."—*Bacon.*	Lime tree, "the flowers begin to open by the middle of May, but are not in their full beauty before the middle of July."—*Phillips's Sylva Florifera.*

From the mildness of some winters in England, furze is met with in blossom, sometimes about Christmas. In the calendar of Flora, in White's Natural History of Selborne, we find the primrose in flower on the 10th of November, and furze in blossom on the 21st of December.

It shows that where the years differ so much, and where the seasons are proverbially variable, complete uniformity cannot be expected in the accounts of the flowering of plants.

Phillips, in treating of the mulberry, observes: "The mulberry tree is stated to have been introduced into this Country (England) in the year 1548, and it is said that it was first planted at Sion House, where the *original trees* still thrive, and which we have seen since the first part of this work has been put to press."—*Phillips's Pomarium Britannicum*, p. 239, London 1823.

Although years may differ, yet on an average of a great number of years, the fact as told by Phillips of these mulberry trees standing the weather so long, tends to show that no great alteration has taken place in the climate of England since the time of their being planted.

There is every reason to think, that variability of seasons is not of modern date. Lord Bacon, in his essay on the vicissitude of things, says: "There is a toy which I have heard, and would not have it given over, but waited upon a little. They say it is observed in the Low Countries, I know not in what part, that every five and thirty years, the same kind and suit of years and weathers comes about again; as great frosts, great wet, great droughts, *warm winters*, *summers with little heat*, and the like, and they call it the *prime*: it is a thing I do the rather mention, because, computing backwards, I have found some concurrence."

We find White, in 1774, in his Natural History of Selborne, complaining of a run of wet seasons, and observing that there was no use in newspapers inflaming the public

mind about combination, that plenty was not to be expected until Providence would send more favourable seasons.

Howard, in his treatise on the climate of London, treating of the popular opinion with regard to St. Swithin's-day, observes: "To do justice to popular observation, I may now state, that in a majority of our summers, a showery period which, with some latitude as to time and local circumstances, may be admitted to constitute rain for forty days, does come on about the time indicated by this tradition, not that any long space before is often so dry as to mark distinctly its commencement; the tradition is so far valuable, as it proves that the summers in this southern part of our island, were subject *a thousand years ago* to occasional heavy rains in the same way as at present." *Howard's Climate of London*, Vol. II. p. 198.

When the English army were searching for the army of the Scots, to bring them to an engagement, near New Castle upon Tyne, in July 1327, the English army suffered severely from rain. Froissart describes their situation thus: "To add to their unpleasant situation, it had rained all the week, by which their saddles and girths were rotted, and the greater part of their cavalry were worn down. They had not wherewithal to shoe their horses that wanted it, nor had they any thing to clothe themselves or preserve them from the rain and cold, but their jerkins or armour, and the green huts."—*Froissart's Chronicles by Johnes*, Vol. I. p. 54.

This quotation from Froissart is valuable, as it corroborates the statement of Howard. All the ancient accounts we have, tend to prove that the climate of England has not materially changed; the dress of the Britons, as described by Cæsar, is well fitted for a humid clime—

"Pellibusque sunt vestiti."

Cæsar de Bello Gal. Lib. V.

Skins were well adapted for keeping out rain and preserving the animal heat.

The description of the climate by Tacitus, would hold good for some of the worst years that are now experienced in England. It would be very difficult for Mr. Williams to get over the quotation from Tacitus. It may be objected to him at every turn. This gentleman thinks that the humidity of the summers in England, has greatly increased, owing to a change on the surface of the island from the increase of hedge rows, from the planting of trees, and from the extension of green crops shading the ground, and preventing its being parched up. There can be little doubt but that the state of the surface of the island, must have *some* effect on its temperature; but when it is remembered that hot and cold seasons arise from *general causes*, and that the *vast Atlantic is the grand source* of moisture; it is to be supposed that Mr. Williams attributed too much to modern improvements.

The very observation which he has quoted of a very old gentleman of Worcester, on the subject of drought, tells against him—"Never fear, I have often known Eng-

land to suffer from too much *cold and wet*, but never from too much heat."—*Williams's Climate of Great Britain*, p. 227.

Howard, in the preface to the second volume of his Climate of London, published in 1820, says: "The result of my experience is, on the whole, unfavourable to the opinion of a permanent change having taken place of latter times, either for the better or the worse, in the climate of this country; our recollection of the weather, even at the distance of a few years, being very imperfect, we are apt to suppose that the seasons are not what they formerly were; while, in fact, they are only going through a series of changes such as we may have heretofore already witnessed and forgotten." Howard also thinks that in its great leading features the climate differs little from what it was at a remote period.

Doctor Rutty, in his Natural History of the County of Dublin, instituted a comparison between the climate of London and the climate of Dublin, by means of registries kept in both cities, from which he concluded that the winters in Dublin were warmer and moister, than in London.

We have the decided opinion of Howard, that no change has taken place in the climate of England, a man, who in knowledge of meteorological details, stands unrivalled.

The comparison which Cæsar made between the climate of Britain, and of Gaul, is what a foreigner would be apt to make at the present day.

The description of the climate and vegetation of Britain, by Tacitus, holds good at the present day.

From the proximity of Ireland to England, we may conclude that no great change has taken place in the climate of Ireland since the time of Cæsar.

That the temperature of Europe in antediluvian times, was greater than it is at the present day, is a subject that admits of no doubt. Attempts have been made, to explain away the fact of the bones of the elephant being found in cold countries; but the finding of the numerous impressions of plants, that now only thrive in tropical regions, sets the matter at rest.

The subject of fossil plants has been studied with great care by M. Brogniart.

Not only in England have been found the remains of the elephant, but also in Scotland.—*Buckland's Reliquiæ Diluvianæ*, p. 179.

From the bones and vegetable impressions found in England, we would from analogy be fully warranted in concluding, that the temperature of Ireland was also great in antediluvian times; but the bones of the elephant have been found in Ireland also.

In Grierson's edition of Boate's and Molyneux's Natural History of Ireland, there is an account from the Philosophical Transactions, of the remains of the elephant found in Ireland. The writer who describes the finding of them, is sadly at a loss to account for their being found in such a climate; he thinks that no ship of the ancient

inhabitants could be capable of importing the elephant, and leaves the reader to imagine how the animal got there before the flood.

Molyneux, in commenting on this subject, thinks, that the elephant under consideration was not brought to Ireland by any industry of man. He supposes that the globe in the early ages of the world, before all records, differed materially from its present geography, as to the distribution of ocean, dry land, islands, and continents, so as to allow this beast a free and open passage from the continent. But a change of climate must be supposed too; the evidence of the Kirkdale cave leaves no doubt but that the climate of the British isles was once suited to animals, that are now only to be met with in warm regions. We may therefore conclude that the elephant in Ireland did not find its way there by mere chance, but that it inhabited the country, and that the climate of Ireland was suited to its existence and habits in *antediluvian times*.

The remains of the moose deer have been found in different places in Ireland; the bone, when treated with muriatic acid, has been rendered flexible. Dub. Phil. Journal, Vol. I. p. 484. The bones discovered at Kirkdale, when treated in the same manner, were made flexible; a proof that the gelatine had not been destroyed by time.

The great temperature of Europe at this period has been explained on the supposition of central heat in our globe: to this cause the writer of this essay attributes the temperature which once rendered Ireland a fit abode for the elephant.

We now come to the historical period, in endeavouring to trace the climate: the researches of Professor Schow, prove that there is no decisive evidence of a material change of climate on the continent of Europe, by records, during the historical period.

Although it is maintained in this essay, that the general character of the climate of Ireland, has been the same from a very early date; yet it is contended for, that the weather has been modified from local causes. The state of the surface of the island has been different at different times, at one time abounding with timber, at another time denuded; at present the surface is furrowed from the potatoe culture in every direction. An ancient name of Ireland was, the woody island.

Endeavours have been made to trace back the history of Ireland to remote antiquity, but on account of some evident fable mixed up with the accounts given, many think themselves warranted in rejecting the entire history of very remote periods altogether.

There is one point (to which if any credence be given) that would be decisive evidence of a change of climate in Ireland at a very distant period, namely, the appearance of rivers that did not exist before, and the formation of new lakes.

This would be evidence of the highest description to prove an increase of humidity in the climate at the time.

Keating, in his History of Ireland, says: "In the time of Partholanus, seven lakes broke out in the island;" again he informs us that "Partholanus found but nine rivers and three lakes in the island."

In the Annals of the Four Masters we have the following accounts:

" Ætas mundi IIDXXXII eruptio lacus con et lacus Techet anno hoc.

" Ætas mundi IIIDIII eruptio novem fluminum.

" Ætas mundi IIIDLXXXI eruptio novem lacuum.

" *Doctor O' Connor's Version of the Four Masters.*"

If these accounts are to be credited, there can be no question as to the increase of humidity of the climate. If we suppose them to be true, we may attempt to explain the previous aridity by the theory of central heat. M. Cordier thinks that the thickness of the crust of the earth varies in different places, and he explains on the principle of central heat, the difference of climate in countries in the same latitude. We know from the fact of volcanoes, that internal fire in some places is not far distant from the surface of our earth, and that its operation sometimes is more active than it is at other times.

We have only to suppose a cessation of activity in the operation of the internal heat in that part of the globe on which Ireland is situated, to account for the condensation of vapours into rain, which previously might be dissolved by the heated air. Indeed there is one point which appears to corroborate this explanation, it is the account in the Irish Annals of the formation of not only new rivers, but also of new lakes.

An increased quantity of rain might cause old rivers to be flooded, or new rivers to be formed, but it would not cause the formation of new lakes, unless the level of the ground had been disturbed by its sinking in some places, or by its elevation in other parts from the operation of an *earthquake*, a visitation universally attributed to the agency of internal fire.

This matter rests entirely on the authority of the old Irish records; where they assume more the shape of historical narrative, they give reason to believe that the climate in Ireland did not materially differ from the climate of the present day, and that remarkably wet, dry, cold, and mild seasons happened occasionally as at the present time.

We have a very early account of a mild climate in Ireland, in the Annals of the Four Masters; we have also an early account of snow. " Ætas mundi IIIDCCCLXVII Erat floribus æstivis ornatus omnis campus in Hibernia tempore Fiachi."—*Annales IV. Magistrorum, Dr. O' Connor's Version.*

Keating tells us in his History of Ireland, that Fionnachta, the son of Ollamh Fodhla, obtained the name by which he was distinguished, on account of the quantity of snow that fell upon the island in his reign. We have in the Annals of the Four Masters, an account of a mild winter at an early period.

" Ætas mundi IIIIICLX Regnante Conario—oberrabant armenta absque custode in Hibernia in ejus regimine propter abundantiam pacis et concordiæ, non fuit tonitrale vel procellosum ejus regnum. Nam non fluxu afficiebat ventus asper, armenta a medio

autumno ad medium veris. Videbantur sylvæ pendentes præ pondere suorum fructuum ejus tempore."—*O' Connor's Version.*

Here we have a description of a mild winter; this and the account of the great fall of snow from which Fionnachta obtained his name, tend to prove the occasional return of mild and severe winters at a remote period.

In Jocelin's Life of St. Patrick, frost and snow are mentioned. The Annals of Ulster show us the recurrence of *wet summers*, of droughts, and of severe winters. Years, remarkable for the abundance of nuts, are mentioned; and we find the frequent recurrence of bowel complaints,-which coincides with subsequent statements.

Subjoined is a list of some of the most remarkable years, from Doctor O'Connor's version of the Annals of Ulster:

"634 Nix magna occidit multos in campo Breg.
684 Ventus magnus terræ motus in insula.
713 Siccitas magna.
719 Æstas pluvialis.
747 Nix insolitæ magnitudinis ita ut pene pecora deleta sunt totius Hiberniæ et postea insolita siccitate mundus exarsit.
758 Æstas pluvialis.
761 Nix magna.
763 Nix magna tribus fere mensibus—siccitas magna ultra modum, fluxus sanguinis in tota Hibernia.
772 Insolita siccitas.
773 Eugan Mac Colmain a fluxu sanguinis moritur, et multi alii ex isto dolore mortui sunt.
776 Diluvia ventosa in æstate, i. e. inundatio magna imbrium et ventus magnus.
778 e, ventris profluvies per Hiberniam totam.
817 —— Gelu mirandum, et nix magna permanserunt a natali quasi usque ad Quinquagesimam. Transitus paludum pedibus siccis, et plurima flumina eodem modo gelata ac lacus.—Plurima materia ad construendas domos transvecta trans lacum Eirne e regionibus Connaciæ in regionem posterorum Crimthani.
821 Gelu mirabile gelavit *mare* et lacus et flumina ita ut conducerentur armenta equorum et greges et vectigalia ultra citraque.
855 Nix et gelu magnum.
911 Pluvialis tenebrosus annus.
912 Pluvialis tenebrosus annus.
916 Nix et frigus valde magnum et gelu mirabile hoc anno ita ut transgredirentur principaliores lacus et amnes Hiberniæ.
944 Gelu magnum mirabile. ita ut transgredirentur lacus et flumina.
1011 Mortalitas, fluxus sanguinis hoc anno in Ardmacha occidit plurimos.
1026 Exercitus cum Flahertaco O'Neill, abstulit obsides et profectus est supra glaciem, in insulam Mochtei et eam vastavit.
1047 Nix magna hoc anno a festo Mariæ ad festum Patricii, cujus non visa est similis ita ut inde mortalitas hominum plurimorum et armentorum et ferarum innumerabilium et volucrum.
1094 Inundationes ingentes in Hibernia tota.
1095 Nix magna cecidit die primi jejunii (i. e. die Mercurii) post Kalendas hujus anni, ita ut occiderit plurimos homines et volucres et armenta.
1107 Imbrium inundationes ingentes cum gelu et nive a xv Kal. Jan. ad xv Kal. Martii vel paulo plus, ita ut mortalitas esset volucrum et armentorum et hominum."

In the year 821, which, according to the computation in these Annals, agrees with the year 822 of the Christian era, it is recorded that the sea was frozen; but we find that in the year 822, the principal rivers of Europe, such as the Danube, the Elbe, and the Seine, were frozen so hard as to bear heavy waggons for a month. It may be boldly asserted, that Ireland, from its insular situation, suffered less by cold that year than the continent of Europe. But it is to be believed, that the state of the surface of the island, unimproved as it was, in comparison with its present state, must have greatly aggravated the cold of a severe winter, when it happened from a *general cause.* Swamps, and bogs, and pools, are soon frozen; at the present, draining, cultivation, and reclaiming, have made great progress.

By the aid of chemistry it is easy to prove that Ireland never could have just claims to the appellation of Glacialis Ierne:

> "Illa ego sum Graiis olim Glacialis Ierne
> Dicta, et Jasoniæ puppis bene cognita nautis."

The water of the ocean mitigates cold in this way; the upper particles of the water, when cooled by the air, sink, and allow a warmer stratum of water to come in contact with the atmosphere; this process goes on, until the water, by long exposure to the cold, acquires its maximum of density.

The vast body of water of the Atlantic must, therefore, at all times, have rendered the winters in Ireland, mild, when compared with the winters in other countries.

The appellation of "Glacialis Ierne," might have arisen on account of navigators from the Mediterranean, having been in the island during a severe winter, in former times. The crew of a vessel from a warm climate in the Mediterranean, would be apt now to form an erroneous opinion of the climate of Ireland, if they had been here in the winter of 1812.

The island described by Diodorus Siculus, is supposed by some to be Ireland, from the description; the soil fruitful, the country diversified with mountain and plain, watered by navigable rivers, abounding in woods, and orchards, and all the island watered by streams, and the summer season fitted for pleasure and amusement—*Diod. Sic. vers. Wesseling, t.* 1, *p.* 344.

Whether this island was the one described by him, or not, is a matter of surmise; however, this description may be received as a true one of Ireland, at the present day. The island inhabited by the Hyperborei, he tells us, was so fruitful, and the climate so temperate, that they mowed twice in the year.—*Diod. Sic. t.* 1, *p.* 158.

Festus Avienus, writing of that which was called the sacred island, says:

> "Hæc inter undas, multum cespitem jacit
> Eamque late, gens Hibernorum colit
> Propinqua, rursus, insula Albionum patet."—*De Oris Marit.*

The expression "multum cespitem" may be received now, as applicable to Ireland, in reference to a peaty soil, or to its grassy sward.

Much confidence is not to be placed in poetic description, with regard to a matter of philosophical inquiry.

We find Claudian also giving Ireland the title of "Glacialis Ierne"—

"Scotorum cumulos flevit Glacialis Ierne."

It has been shown that Ireland never could have been remarkable for cold, in comparison with other countries.

Tacitus described the climate of Britain as being foul, with frequent showers and clouds, and stated the absence of severe cold; and he described the climate of Ireland as not differing much from it—

"Solumque cœlum et ingenia cultusque hominum haud, multum a Britannia differunt."

Cæsar previously had described the cold of Britain as less than that of Gaul. Professor Schow has proved that there is no evidence to establish a material change in the climate of France; we here connect Ireland with the chain of his reasoning.

The comparison which Doctor Rutty made between the climate of Dublin, and the climate of London, shows, that in the grand leading features, there is a similarity in the climate of both places: thus his statement corroborates that of Tacitus.

In a work supposed to be written by Æthicus, the climate is described as superior to that of Britain. Orosius repeats this statement—"*Hæc propior Britanniæ, spatio terrarum angustior, sed cœli, solisque temperie magis utilis.*"—*Orosius, Lib.* 1, *Hist. cap.* 2.

Isidorus says that Ireland is more fertile than Britain.

The venerable Bede gives a decided preference to the climate of Ireland. "Hibernia autem salubritate ac serenitate aerum multum Britanniæ præstat."

The observations of Doctor Rutty show that the winters in Ireland are milder than in England."—*Rutty's Natural Hist. of the County of Dublin*, Vol. II. p. 466.

The description of the island by Donatus, has been often given:

"Insula dives opum, gemmarum, vestis et auri
Commoda corporibus, aere, sole, solo
Melle fluit pulchris et lacteis Scotia campis
Vestibus atque armis, frugibus, arte, viris
Ursorum rabies nulla est ibi sæva leonum
Semina nec unquam Scotica terra tulit
Nulla venena nocent nec serpens serpit in herba
Nec conquesta, canit, garrula rana lacu."

The picture which Cambrensis has drawn of the climate of Ireland, bears with it the marks of having been highly coloured; in the first place the style is poetical—"Terra autem terrarum temperatissima nec Cancri calor exæstuans compellit ad um-

bras, nec ad focos Capricorni rigor invitat, aeris amænitate temperieque tempora feré cuncta tepescunt."—*Topog. Hib. dist.* 1, *cap.* 25.

Again, in another part he observes—"Aeris clementia tanta est ut nec nebula inficiens, nec spiritus hic pestilens nec aura corrumpens, medicorum opera parum indiget insula; morbidos enim homines præter moribundos paucos invenies."—*Topog. Hib. Dist.* 1, *cap.* 27.

The Abbè Ma-Geoghegan, in commenting on this description by Cambrensis, in his History of Ireland, remarks thus—"Cependant le temoignage de Cambrensis me paroit un peu suspect, parce qu'il est outre. En effet les pluies, les neiges et les gelées y sont assez frequentes en hyver." He might have shown by the Irish Annals, previous to the invasion, and by Ware's Annals, at a subsequent period, that cold winters have been often recorded. It is manifest, by these documents, that the inhabitants of this country were not entirely so free from disease, as Cambrensis described them to be.

In the Irish Annals, we find that bowel complaints were not unfrequent. In fact, distempers of this nature were called by the general name of the country disease.

Dermot Mac Murrough, the cause of the invasion in the time of Cambrensis, did not die of old age, but of disease. The soldiers of the English army were affected by sickness.

It is probable that the armour of the English adventurers, particularly of the chiefs, afforded protection, not only against the weapons of the natives, but also protected them in some measure, from the drenching rains of the island.

The expression of Cambrensis is very vague—"Morbidos enim homines præter moribundos paucos invenies." It might as well imply that the faculty in those days, made quick work with their patients.

Although the account by Cambrensis, of the climate, is exaggerated, still it may be received in evidence, as to the general mildness of the weather in Ireland.

Kirwan in his work* on the temperature of different latitudes, thinks that "the astronomical source of heat is permanent." If this be the fact on an average of years, and if it has held good in former times,† it must follow that less inconvenience was felt from heat in summer, at the time of Cambrensis, in Ireland, than at a subsequent period, when the woods were cut down. When woods abounded in Ireland, of course a great portion of the surface of the island was sheltered from the rays of the sun; therefore, moisture on the ground in the woods, could not be rapidly dried up.

Evaporation causes a depression of temperature; the constant evaporation from extensive woods must, independently of the shade afforded, have tended to keep the surface of the island cool in summer, at the time of Cambrensis.

* Kirwan, page 107.

† There is every reason to think that it has, from the investigation of Professor Schow of Copenhagen.

A good deal of information relating to the weather in Ireland, may be collected from Ware's Annals. The following are extracts:

"A.D. 1171 This winter the English soldiers, by the scarcity of provision, and change of air and diet, contracted several distempers, and many died.

"1172 A very tempestuous winter, the king having stayed three months in Dublin.

"1192 This likewise may seem worth the remembering, that this year there were so great tempests in Desmond, that many houses and churches were beaten down, and much cattle and men destroyed.

"1209 The city of Dublin, by reason of some great mortality, being waste and desolate, the inhabitants of Bristol flocked thither to inhabit.

"1247 The same year, saith Florilegus, there was a marvellous and strange earthquake over England, but saith Feleon, over Ireland, and all the west of the world; and there followed immediately a continual intemperature of the air, with a filthy skurf, the winter stormy, cold, and *wet*, which continued until the 11th of July, and put the gardeners, fruiterers, and husbandmen, void of all hope, insomuch that they complained *that winter was turned to summer, and summer to winter*, and that they were like to lose all, and be undone.

"1326 The earth received fruitfulness, the air temperature, and the sea calmness.

"1348 This year there was great mortality in all places.

"1361 About Easter, began a great mortality of men, but few women in England and Ireland.

"1370 There was a third pestilence in Ireland.

"1383 The fourth great pestilence was in Ireland.

"1486 March, there happened so great a storm of wind and rain, that trees were pulled up by the roots, and many houses, and some churches, were blown down to the ground.

"1489 This summer proving very pestilent and feverish, many people died.

"1491 This year was commonly called by the natives, the dismal year, by reason of *the continual fall of rain all the summer and autumn*, which caused great scarcity of all sorts of grain throughout Ireland.

"About the latter end of December, after the appearance of a blazing star, which shone for some days, a certain grievous and pestilential sickness, commonly called the English sweat, began first to afflict this nation.

"1492 There was so great a drought this summer, throughout Ireland, that many rivers were almost dried up, the cattle dying every where with thirst; also soon after the pestilence began to rage.

"1500 This year from the middle of September, till the end of winter, Ireland endured *continual rains*, and many tempests.

"1504 This year the pestilence swept away many people, almost every where, but especially in Ulster.

"1505 The plague not yet ceasing, did even this year also, grievously afflict Ireland, a great dearth of corn following it by reason of the *continual rains* that fell in summer and harvest.

"1510 This year, in the month of April, did happen great *inundations*, which overturned trees, houses, and bridges.

"1517 In this year was a very hard winter, so that the ice of the rivers did not only for a long season bear up men upon it, but also loaded carts.

"1522 The city of Limerick was sadly visited with the plague.

"1523 There was great scarcity of corn this year in Ireland, by reason of the *continual rains* in summer.

"1525 The pestilence was rife all this autumn, especially at Dublin.

"1528 This year a certain grievous and pestilential disease, commonly called the English sweat, did overspread a great part of Ireland.

"1534 An earthquake happened at Dublin, which accident is so rare in Ireland, that when it falls out so, it is esteemed as a prodigy.

"1535 A raging pestilence did this year sweep away many, especially in Ulster.

"1539 This summer so great a drought was in Ireland, that many rivers were almost dried up. The autumn also was very sickly, fevers and bloody fluxes, being rife every where, whereof many died. An extreme hard winter followed, insomuch that store of cattle perished in many places.

"1548 February, there happened such a strange violent tempest, or rather hurricane, in most parts of Ireland, that by the force of it, trees were rooted up, and churches and other edifices, quite blown down.

"1552 In this year there was such a scarcity of corn in Ireland, that a peck of wheat (which contains four bushels of English measure) was sold in Dublin for twenty-four shillings; but the following year carried such plenty with it, that a peck of pure wheat was sold for five shillings.

"1554 This year there was a very sad winter, especially from the 21st of December, to the end of the following spring, either *perpetual rain*, hail, or tempest.

"1574 This summer the plague raged in Dublin for several months.

"1599 The Lord Lieutenant, Earl of Essex 'towards the end of July, returned to Dublin, his army being much diminished in number, fatigued, and in a sickly condition.'"

These annals show the occasional occurrence of very dry summers, of very severe winters, and of seasons so wet as to cause a scarcity of corn in Ireland. It does not follow by any means, that all the remarkable years are included in these annals; for instance, Ware had to collect the accounts of the weather from books, written without any particular view to meteorology.

Necessity is justly called the mother of invention; where the mere whim of

fashion does not influence, we may discover in the dress of particular nations, some indications of the nature of the climate.

The large shading hats of the Spaniards, bespeak a sunny clime.

The conical caps of the ancient Irish, were admirably adapted for protecting the head against rain, and may be received as collateral evidence of a moist climate.

Cambrensis describes the Irish as dressed in woollens, and the mantle as a protection against the rain, is mentioned by Spencer.

The account of the Irish in the reign of James I. as given by Morryson, is scarcely worthy of notice; he says—"In the remote parts where the English laws and manners are unknown, the very chiefs of the Irish, as well men as women, go naked in the winter time." Dr. Leland gives no credit to this account of Morryson; he remarks—"The fact is totally incredible, the climate must at all times have forced the most barbarous to some covering in their retired chambers." Walker, in his essay on the dress of the ancient Irish, agrees with Leland on this point; and it is worthy of observation that Morryson speaks of the remote parts, with which of course he was the least acquainted; besides, and what has not been remarked by Leland or Walker, Morryson had been present at the celebrated siege of Kingsale, at the time of the Spanish invasion, and therefore was a witness of the severe weather that prevailed during that siege.

In his history of Ireland, L. Abbè Ma Geoghegan, thus writes of the dress of the Irish—"Les manufactures de toiles d' etoffes, de tout ce qui etoit necessaire pour les couvrir et garantir de l' intemperie de l' air etoient connues aux anciens Irlandois."

The abundance of timber in former times, must have led the inhabitants, in Ireland, as it does in America at present, to construct habitations of that material. In Hanmer's Chronicle, we have the reasons assigned by Mac Mahon, an Irish chieftain, for not residing in a castle. Hanmer informs us, that Mac Mahon levelled two castles bestowed on him by Sir John De Courcy, a short time after the coming of the English. He said that he had promised not to hold stones, but land, and that it was contrary to his nature to couch himself within cold stones, the woods being so nigh.

The desire of the ancient Irish to reside in woods, no doubt arose from the shelter afforded against the winds, from the proximity of timber for the construction of habitations, and for fuel, and probably from the facility of enclosing, by means of stakes between the trees, during the night, their cattle, always a desirable prey amongst a pastoral people, divided into a number of septs, frequently in a state of hostility with each other.

Cambrensis tells us that woods were inhabited as places of defence: "Hibernicus enim populus castella non curat, sylvis namque pro castris, paludibus utitur pro fossatis."—*Top. Hib. Dist.* 3, *c.* 37.

In the Dublin Philosophical Journal, there is an account of the finding of the body of a man preserved in a peat bog, and dressed in a singular costume. The dress was

composed of the skin of some animal, laced in front with thongs of the same material, and having the hairy side inwards. The writer who describes it, thinks that it belonged to a period antecedent to Cambrensis, as he described the Irish dressed in woollen garments. However this may be, the dress is well adapted for keeping out rain, and may be received in evidence of a rainy climate when the wearer lived.

The woods in winter afforded protection to the inhabitants against high winds, and in warm summers yielded a pleasant shade; but military defence was probably the great inducement for their choosing such places of residence.

In the Speculum Regale, a treatise written in the twelfth century, the inhabitants of Ireland are described as being well clothed in winter and summer.—*Antiquarian Repertory*, Vol. II. page 336.

The loose coat, a garment so much worn by our peasantry, is supposed to be a remnant of the old Irish mantle.

This garment, the great coat, worn in winter and summer, is often valuable in affording protection against rain in a variable climate.

However mild the climate of Ireland is to persons who can have the shelter of a house when necessary, still to troops in the field, obliged to march at all hours, and, of course, exposed to wet, it must be any thing but agreeable.

Therefore, it is not strange that we find, in the history of Irish warfare, complaints of the weather, and of sickness amongst the troops, particularly amongst those newly arrived.

It is extraordinary how well the Irish peasantry bear the drenching rains of this climate—they travel, and frequently work, in weather that would prove destructive to strangers, or even to men from the cities or towns in Ireland.

The sufferings of different armies, at different periods, tend to prove, therefore, that the general character of the climate has been the same.

The troops of Henry the Second were affected with sickness.

The army of Bruce, when he invaded Ireland, suffered from the weather.

The army of the Earl of Essex, in the reign of Elizabeth, was diminished by sickness; indeed the English troops in Ireland, in her reign, suffered dreadfully from the climate.

The sufferings of the soldiers of Cromwell are well known. It would appear that officers of rank, at this period, had sometimes recourse to oil cloth, as a protection against the weather. Ludlow, in his memoirs, says, "I clothed myself as warm as I could, putting on a fur coat over my buff, and an oiled one over that, by which means I prevented the farther increase of my distemper."

Who has not heard of the sufferings of the army of William the Third in Ireland from the climate?

In the Pacata Hibernia we have a good deal of detail given of the weather in Ireland, in the reign of Elizabeth.

June is stated to be a convenient time to be in the camp. "Whereas, if the service should be deferred until winter, difficulties should they find in the foulness of the weather, and deepness of the way." In July, the Lord President left Limerick, to relieve a place in Kerry, "and set forward the three and twentieth of July; but, whereas by reason of *continual rain*, that had lately fallen in great abundance, it was thought that the mountain of Sleulogher was impassable for carriages, was constrained to take the way of Thomond." In January, the Lord Dunboyne forced Redmond Burke's forces into the Nore, where seventy of his men were drowned, "the river Nore being at that time very high. The ninth of August Sir Francis and his troops lodged at Alphine, in the County Roscommon; the morning following was dark and misty."

(September.) And no sooner could there a ship appear upon the coast, but presently it was supposed to be a Spaniard, but there none appeared before the seventeenth of the same month, which the Lord President perceiving, and that the winds still were contrary, and the weather very stormy and tempestuous."

(October.) It is stated that in this month some ships with provisions were detained in Waterford, "enforced to stay there, the wind being southerly."

The early part of the month is described as *so wet*, that it was unfit for the army to take the field.

A short time after the commencement of the siege of Kingsale, the weather is described "falling out very foul." And again, "We attended all that day for the landing of the artillery, and perfected the entrenchment about the army, which was left unperfected the day before, through the extreme foulness of the weather."

(November.) "For the mountain Slewphelim, which, in summer time, is a good ground to pass over, was, by reason of *great rains*, *so wet and boggy*, as that no carriage or horse could pass over." The writer of the Pacata Hibernia next speaks of the frost that enabled O'Donnell's army to cross this mountain, on their way to assist the Spaniards: "There happened a great frost, the like whereof hath been seldom seen in Ireland."

An account is given, that ships, with supplies from England to the siege of Kingsale, were driven to the "southermost part of Ireland" by the foulness of the weather. The besiegers were prevented on the 17th from attempting any thing, on account of the weather, but at night, "when the storm was somewhat appeased," they caused some officers to view the ground of Castle Ny Parke. Next, the extreme frost is spoken of as a difficulty in making approaches: "Continued to work all night, and although the ground was extremely hard, and the night very light, yet they brought the work to very good perfection."

The variable nature of the climate is well marked by the next quotation—"The enemy sallied about eight of the clock in the night, being extreme dark and rainy, with about two thousand men."

(December.) Sir Richard Levison returned into the harbour of Kingsale, and reported to the Lord Deputy the damage done to the Spanish fleet at Castlehaven: "the seventh of December, the wind being extremely at south-east, he rode still at Castlehaven, the night following, with wind at west-south-west, he warped out with the ships." While Sir Richard was at Castlehaven he was exposed for some time to the fire of cannon from the shore, "being by no industry able to avoid it until some calmer weather came."

"The thirteenth, the weather fell out to be extreme foul and stormy. The fourteenth, foul weather, wherein nothing was performed. The seventeenth, foul and stormy weather. The nineteenth, by reason of stormy and foul weather, nothing on either side was performed. This morning the ordnance played oftener." By the context it appears to have been the twentieth. "The next morning that work was brought to great perfection, though the night fell out stormy, with great abundance of thunder and lightning, to the wonder of all men, considering the season of the year." The latter end of December is described as being extremely tempestuous, *cold, and wet,* at the time an attack was expected from O'Neal's army.

In February Captain Flower was obliged to put back, in an attempt to reach the castle of Dunboy, "by reason of foul weather and contrary winds."

In a letter, dated the 15th of February, 1601, O. S. the wind is described so westerly, as to prevent the arrival of shipping to carry away the Spaniards that surrendered.

"The eighth of March, Don Juan being at Kingsale, hourly expecting a wind to be gone, and, finding a flattering gale, went aboard, but, for want of a fair wind, departed not from Kingsale until the sixteenth of the same month."

(May.) The army is described as on its way to besiege the Castle of Dunboy. "The fifth and sixth the weather was so tempestuous, that we could not stir out of quarters. The thirteenth, unseasonable weather. From the seventeenth to the six and twentieth nothing happened worthy of notice, only we were detained in our camp with contrary winds, and with strange, unseasonable, and tempestuous weather. The six and twentieth the wind turned fair, and the shipping drew forth, but immediately the weather proved so tempestuous, they were constrained to return to their former road. The seven and twentieth, the eight and twentieth, the nine and twentieth, and the thirtieth, we were detained with like contrary winds, and unseasonable, foul, and stormy weather. The one and thirtieth the weather grew fair, and we took advantage thereof."

(June.) "The sixth being Sunday, a foul and stormy morning." It is to be supposed that the rest of this month was favourable, as no complaint is made of the weather during the siege of the castle of Dunboy.

(July.) We find, by the Pacata Hibernia, that in this month Sir Charles Willmot was sent into Kerry, to remove all the inhabitants, with their goods and cattle, into

the County Limerick, and to destroy such corn as could not be presently reaped. "But in effecting hereof, the governor found great difficulty, for the harvest, by reason of the *winter-like summer, was very backward.*"

It ought to be remarked here, that barley was very much cultivated at this period in Ireland, and in treating of the vegetation of the island, it can be shown that barley in modern times has been reaped very early in Kerry.

(October) "Easterly winds are so seldom upon this coast, as it would ask a long time to transport victuals and munitions by sea."

(January) "The sharpness of this winter journey, did exceedingly weaken our companies, for the mountains of Beare, being at that time quite covered with snow, tasted the strong bodies, whereby many returned sick; and some, unable to endure the extremity, died standing sentinel."

Snow on the mountains, at this time of the year, is not of uncommon occurrence at present; and we have evidence from the same work, the Pacata Hibernia, to render it probable that the cold was not so severe as to freeze the rivers; for, on the 5th of January, in an account of a fight between the troops of Captain Taffe, and those of Owen Mac Eggan, the troops of the latter were driven into the river Bandon: "leaped into the river Bandon, hoping by that means to escape; but that little availed them, for they all for the most part, were either killed or drowned in the river.

(March) "After the Lord Deputy departed, by reason of easterly winds, the President was stayed about three weeks in Dublin, during which time, every day, posts were employed between them."

Here we have an account of the prevalence of easterly winds in the spring, which is well known to hold good at present. This prevalence of easterly winds, in the spring, was also remarked at the time of Doctor Boate, in Ireland. Doctor Rutty informs us, that the easterly winds in spring, are nearly double to what they are in autumn and winter, and that the North East wind in spring, is double to what it is in autumn and winter.—*Natural History of the County of Dublin, Vol. II. p.* 457.

Indeed, taking in general, the details of the weather in the reign of Elizabeth, as they are to be gathered from the Pacata Hibernia, we find a similarity between them and the observations of Doctor Rutty. June is stated to be a convenient time to be in camp, in the above cited work: by Rutty's statements, there would be a good chance of fair weather in this month. By the Pacata Hibernia, it appears that abundance of rain fell in July. During the space of forty-three years in Dublin, in seven years only was the month of July fair and dry.—*Natural History of the County of Dublin, Vol. II. p.* 462.

We have it expressly stated in the Pacata Hibernia, under the head of October, that easterly winds were seldom on the south coast of Ireland.

There is reason to think from the context, that the frost, which was of unusual severity, at the time of the siege of Kingsale, was ushered in by a north wind, because the ships, with supplies from England, were driven to the southermost part of Ire-

land. Rutty observes, that the great frost in 1739-1740, was attended with an unusual suspension of our trade winds of the west and south west.

The frost at the siege was put to an end, most likely by a change of the wind to the south. The enemy are stated to have sallied out on a dark, and rainy night; soon after, we find by a quotation, the wind to be at south east.

Campion, in his History of Ireland, says—"The soil is low and waterish, and includeth divers little islands, surrounded with bogs and marshes—highest hills have standing pools on their top. Inhabitants, especially new come, are subject to distillations, rhums, and flixes, for remedy whereof they use an ordinary drink of aqua vitæ, so qualified in the making, that it drieth more and inflameth less than other hot confections. The air is *wholesome, not altogether so clear and subtle as ours of England;* of bees, good store—*no vineyards*, contrary to the opinion of some writers, who both in this and other errors, touching the land, may be easily excused, as those that wrote of hearsay. Cambrensis, in his time, complaineth that Ireland had excess of wood, and very little champaign ground, but now the English pale is too naked."

This observation of Campion, respecting vineyards, may be considered as an answer to Bede's statement of the vine being found in Ireland. Indeed the expression of Bede is not very strong; he says "*nec vinearum expers.*" The same may be said of Ireland now, where the vine is cultivated for ornament.

Spencer describes the island adorned with woods, the heavens as most mild and temperate, though somewhat moist; but in another passage, in discussing the origin of the Irish mantle, and in maintaining that it was introduced by invaders; he says—"And coming lastly into Ireland, they found there more special use thereof, by reason of the raw cold climate." On this passage it may be observed, that it is well known to philosophers, that our sensations from cold are not always in proportion to the degree indicated by the thermometer; a certain degree of cold, combined with moisture, will produce on our frames very chilling effects. There is nothing in those observations of Spencer, that ought to induce us to think that any great change has taken place in the seasons, since his time. Moisture, combined with a certain degree of cold, is a sufficient inducement to the use of warm clothing. In describing the various uses of the mantle, he adds—"When it raineth it is his pent house, when it bloweth it is his tent, when it freezeth it is his tabernacle."

In Spencer's account of his plan for putting an end to the disturbances in Ireland, we have some insight into the nature of the winters in his time; he observes—"It is not with Ireland as it is with other countries, where the wars flame most in summer, and the helmets glitter brightest in the fairest sunshine. But in Ireland the winter yieldeth the best services, for then the trees are bare and naked, which use both to clothe and house kern; the ground is cold and wet, which useth to be his bedding; the air is sharp and bitter to blow through his naked sides and legs; the kyne are barren and without milk, which useth to be his only food; neither if he kill them,

will they yield him flesh; nor if he keep them will they give him food: besides being all with calf for the most part, they will, through much chasing and driving, cast all their calves, and lose their milk which should relieve him next summer."

It ought here to be particularly remarked, that no allusion is made to severe frosts, as a hard frozen state of the ground would be of the greatest consequence to the pursuers, in enabling them to follow through bogs and marshes, in the most direct line, those who in other circumstances might escape by their knowledge of the country. It is, therefore, just to infer, that severe frosts were not of frequent occurrence in Ireland at the time. We have the ground described *as cold and wet*, such as it is commonly with us in winter.

It does not follow but that severe winters occasionally occurred as they doin modern times.

In Sir W. Betham's Antiquarian Researches, Life of O'Donnel, the frost is mentioned by which young O'Donnel lost some of his toes, in escaping from Dublin. In like manner, an unusually severe frost is described in the Pacata Hibernia, by which the same O'Donnel, at a subsequent period, was enabled to cross a swampy mountain with his army, on his way to assist the Spaniards, besieged in Kingsale. But, if a hard frozen state of the ground was of common occurrence in winter, it is difficult to suppose that the acute Spencer would not have alluded to it.

The remarks of Spencer are worthy of every attention; from his long residence in Ireland, he had ample opportunities of observing the general state of the island, and of making a comparison between its climate, and that of England. He, no doubt, contrasts the Irish climate with the English, when he says that it is most temperate, though somewhat moist.

In modern times, another Englishman, Arthur Young, came to the same conclusion from his own observation.

We shall now have to direct attention to the character of the climate, as given by Sir James Ware; he says—"Pomponius Mela affirms that the temperature of Ireland is unfit to bring seeds to maturity. But more particularly, Giraldus Cambrensis, says: 'Thus corn promises much in the grass, more in the straw, but least in the ear; for the grains of wheat are so small, that they can scarce be cleansed by the help of a fan.' Let us hear now what others of the ancients have written to the contrary. Thus, therefore, Orosius: 'It lies nearer,' says he, 'to Britain; is less in extent, but of a more temperate air and profitable soil.' Likewise, Isidore: 'The next island to Britain, less in extent of land, but more fertile;' and Bede: 'Ireland,' says he, 'both in healthfulness, and also serenity of the air, much excels Britain. But to speak my opinion: if these comparisons relate to the south part of Britain, which we call England, they are not to be allowed, yet we grant that Ireland is of so temperate an air, that *we see the fields green and flourishing in the midst of winter, and cattle put daily to grazing, unless in time of snow, which is rarely of two or three days continuance.*

Many boggy and fennish places being also now drained, the temperature of the air has been much *improved.* As to the grains of corn, they are not *generally* so small as Giraldus and his followers say; for in very few of the neighbouring countries, fairer or larger corn is to be found, than in Ireland. Nor can we allow of the opinion of Raphael Maffeus Volateranus, that Ireland produces nothing but corn and horses. The error likewise of Ranulphus Higden, that Ireland has no pheasants, partridges, deer, nor hedgehogs, is to be corrected. We might observe many things that are fabulously delivered by Giraldus Cambrensis, concerning Ireland; and the reader is to take notice that Giraldus's Topography is to be read with caution, as Giraldus himself in a manner acknowledges in the apology which he makes in his preface to his book of the conquest of Ireland."—*Ware's Antiquities of Ireland, chap.* 23.

Here we have the testimony of Sir James Ware, that in his time, the fields were green in the midst of winter, and that cattle were not prevented from grazing, *except in case of snow, which rarely lasted two or three days.*

In the Speculum Regale, a work supposed to be written in the twelfth century; we are informed that oxen and sheep were continually fed out of doors in Ireland.—*Antiquarian Repertory, Vol. II. p.* 336.

Petrus Lombardus, in his book de De Regno Hiberniæ Sanctorum Insula, stated that the inhabitants neglected to make hay. "Hic plerique negligunt resecare fœnum ob summam temperiem aeris." The mildness of the climate is here given by him as the cause; but though this neglect of saving hay might have been very common in his time, yet the word "plerique" shows that it was not universal.

Patterson thinks it may be accounted for, by the plenty of ground they had in proportion to the stock of cattle.

The evidence of Lombard and of Sir James Ware, may be put in opposition to the statement of Hamilton, who thinks that the great mildness of our winters is of recent date. He says in his memoir on the Climate of Ireland—"Winter has likewise felt the general influence of this Atlantic temperature, our grasses scarcely droop beneath the frost." When he penned this he certainly could not have recollected, that Boate, in his work on Ireland, had also mentioned, *that in his time, cattle fed out in the fields, day and night in winter, and were seldom troubled with great frost.* Thus the statement of Hamilton himself may be used *now* to show that no great change has taken place in the climate.

Some particulars relating to the climate, may be gleaned from the history of the civil war, at the time of Charles I. Sir J. Temple describes the weather as very severe on the breaking out of the rebellion in 1641—"Most bitter cold and frosty." He describes it as the severest year in the memory of man. Among other reasons for sending an army of Scots into Ireland, one was, "that their bodies would better sort with the climate."—*Sir J. Temple's History of the Rebellion of* 1641.

About the middle of March, 1643, the Marquis of Ormonde's army at the siege of Ross, suffered from "*continual rains.*"—*Warner's Civil Wars, Vol. I. p. 252.*

In the middle of June, 1643, some cavalry under Lord Castlehaven, "being favoured by the rain," succeeded in a charge, in routing the troops under Sir Charles Vavasour.—*Warner, Vol. I. p. 271.*

The forces of the council of Kilkenny, in 1645, laid siege to the fort of Duncannon "in January, and in extreme bad weather."—*Warner.*

When O'Neil and Preston, advanced in the winter of 1646, to Dublin, to besiege it, the bad weather and a flood in the Liffey, which carried away some bridges, interfered with their operations.—*Warner.*

In September, 1649, the English fleet, with an army, and Cromwell aboard, were put into Dublin by a strong gale from the south.—*Ludlow's Memoirs.*

The English army, shortly after their arrival, were affected with flux.—*Ludlow.*

Cromwell laid siege to Wexford, in October 1649, and took it after a short time. The Marquis of Ormonde was greatly disappointed, for he had flattered himself that it "would hold Cromwell long enough in play until his forces, which were unused to the climate of Ireland, would be so considerably reduced by the fatigues of a siege at such a season."—*Warner, Vol. II. p.* 188.

"Though the siege of Wexford had been very short, yet Cromwell's army were not all pleased with a winter campaign, and complaining of great hardships, began to mutiny."—*Ibid, p.* 189.

A. D. 1650 "The English army were much wasted with sickness and hard duty, as well as the plague, and the greatest part of those he (Cromwell) had brought with him, had perished; but the fatal revolt of the Munster forces, had recruited him with men, habituated to the climate, and inured to the hardships of an Irish war."—*Ibid, p.* 208.

A. D. 1651, Siege of Limerick—"Ireton lost many men by hard service, change of food, and alteration of the climate."—*Ibid, p.* 243.

Cromwell's army being attacked with flux soon after their arrival, coincides with the account of the climate which had been given by Campion.

We can judge of the general character of the climate of Ireland, on an average of years from the work of Doctor Boate. He observes—"So that the Irish air is greatly defectuous in this part, and too much subject *to wet and rainy weather*, wherein if it were of somewhat a better temperature, and as free from too much wet, as it is from excessive cold, it would be one of the sweetest and pleasantest in the whole world; and very few countries could be named that might be compared with Ireland for agreeable temperature. Although it is unlikely that any revolution of times will produce *any considerable alteration* in this, (the which indeed in some other countries, hath caused wonderful changes) because that those who, many years ago, have written of this island, *do witness the self same things of it in this particular, as we do find*

in our time: there is, nevertheless, great probability, that this defect *may in part*, be amended by the industry of man, if the country, being once inhabited throughout by a civil nation, care were taken every where to diminish and take away the superfluous and excessive wetness of the ground, in all the watery and boggy places, whereby this too great moistness of the air is greatly increased, and also occasioned.

"This opinion is not grounded upon some uncertain speculation, but upon assured experience, for several knowing and credible persons have affirmed to me, that already some years since, good beginnings have been seen of it, and that in some parts of the land, well inhabited with English, and where great extents of bogs have been drained and reduced to dry land, it hath been found by the observation of some years, one after another, that they have had a drier air, and much less troubled with rain than in former times."

The number of rivers and brooks in Ireland is the best proof of its great moisture. Boate says: "No country in the world is fuller of brooks than Ireland, where the same be numberless, and water all the parts of the land on all sides."

On the subject of cold, he remarks there are commonly three or four frosts in one winter, but they are very short, seldom lasting longer than three or four days together, and withal at their very worst, nothing near so violent as in most other countries. "There hath been," he observes, "some winters wherein it hath frozen ten or twelve days together, so as the Liffie, and other the like rivers, were quite frozen, and might be gone upon by man and beast; but those are altogether extraordinary, and do come very seldom, hardly once in the space of ten or twelve years."

Here we have some evidence to show, that the extension of cultivation had, up to the time of Doctor Rutty, *some effect* in mitigating the cold of severe winters when they did happen. We do not find the Liffey, on an average of years, so often frozen over, that it might be gone upon by man and beast, as was described by Boate in his time.

Kirwan's observations on the weather, correspond in the general features with the accounts handed down by Rutty.

Rutty's descriptions are, as Kirwan remarks, merely popular; they therefore cannot be accurately compared with more precise accounts in latter days; but, on the other hand, these have been made at different periods, in different places, and by different persons.

They lose much of their value, if the opinion maintained by many, be correct, namely, that the seasons go through a cycle; therefore it would be necessary, that observations made in any one place, should be continued for a very long time, before we would be warranted in attempting to draw very precise conclusions.

The unconnected accounts we have, answer, however, to show the general nature of the climate, which agrees in its principal points with ancient accounts, and with those of Rutty and Kirwan. We have mostly a prevalence of south and south west winds

in the winter, and of north and north east winds in the spring, the wetness of winter, the humidity of the summer, particularly about the time of July, and the variability of different years, when closely compared with each other. *On the supposition of a cycle, variability of years ought to be expected, and a variation is manifest in the accounts we have.*

When we have a severe winter in Ireland, it is the effect of a general cause, acting with greater effect on the continent. Ancient and modern accounts agree as to the usual mildness of our winters.

Boate observes—"For the most part there falleth no great store of snow in Ireland, and some years, none at all, especially in the plain countries. In the *mountains*, there is commonly greater plenty of snow than in other parts, so that all kinds of cattle do, all winter long, remain there abroad, being seldom troubled with very great frost or snow, and do feed in the fields, night and day."

The very attempt of Hamilton, in modern times, to prove a change of climate, by describing its great mildness, only corroborates Boate's statement, and must inevitably lead the impartial reader, who compares the two accounts, to conclude that *no great* change has taken place.

Boate describes the heat of summer thus—"The which is seldom so great, even in the hottest times of the year, as to be greatly troublesome. And it falleth out often enough in the very summer months, that the weather is more inclinable to cold, than to heat, so as one may very well endure to come near a good fire. And this cometh to pass only during the wet weather, for else, and whilst it is fair, it is very warm all summer long, albeit seldom over hot."

There is a strong similarity in the description of the spring of the year, given by Boate, to that given by Rutty in his time. Rutty showed that the winds from the rainy points were not prevalent in the spring. Doctor Boate, says—"And it raineth there very much all the *year long, in the summer as well as in the winter ;* commonly in the spring of the year it is very fair weather, with clear sunshine from morning till night, for the space of five or six weeks together, with very little or no interruption, which fair weather beginneth commonly in the month of March, some years in the beginning, other years in the midst, and sometimes in the latter end of it. But the same being once passed, it raineth afterwards very much all the summer long, so as it is a rare thing to see a whole week pass without it, *and many summers it is never dry weather two or three days together.* Which inconstancy of the weather, is not only troublesome to men, but also hurtful to all things growing out of the earth for man's behoof."

What will the advocates for an increase of humidity in summer, in modern times, say to this ?

The above quotation from Boate, is enough of itself, to upset the doctrine maintained in Hamilton's Memoir on the Climate of Ireland.

That close observer, Doctor Rutty, tells us, that "a series of hot and dry weather, even in summer, is what the farmer ought not to expect, but to provide for the contrary."—*Natural History of the County of Dublin, Vol. II. p.* 281.

In the Introduction to Cox's History of Ireland, the comparison is made between the climate of England and Ireland. The summers are stated to be warmer, and the winters colder in England, than in Ireland. He adds, thus—"It may be expected, that as the bogs are drained, and the country grows populous, the Irish air will meliorate, since it is already brought to that pass, that fluxes and dysenteries, which are the country diseases, are neither so rife, nor so mortal, as they have been heretofore."

In the reign of William III. the potatoe culture was extending itself in some degree in Ireland, the country was denuded of timber, and was therefore less shaded in summer, than it was in the time of Cambrensis. By Cox's statement, bowel complaints had become less prevalent than before.

The trenches in the potatoe culture, were admirably adapted for quickly removing superfluous water, as the best mode of forming them is in the direction of the summit of a range of hills at right angles with it. It was, therefore, no wonder, that in the places where the culture of the potatoe was commenced, *some improvement* should be experienced in the *time of Cox, in the reign of William the Third.*

As the country was denuded of trees, and as the surface was not shaded in every direction by luxuriant stalks of potatoes in summer, as it is at present, when a warm summer occurred, the inhabitants must have experienced some inconvenience from heat. Leland says of the garrison, during the celebrated siege of Derry—"The heats of summer proved even pestilential to men fatigued and confined; and their scanty, and unwholesome diet, inflamed their disorders."

The history of the war at this period, in Ireland, affords ample testimony of the general moist character of the climate.

Some extracts from Leland may answer better than a long commentary. Speaking of the sufferings of Schomberg's army, he says—"His men had already experienced the hardships of their present service, wasted by a fatiguing march in rain and tempest, in cold and hunger, through a country, dispiriting by its aspect, and by the inclemency of the season rendered still more dreary and distressing."

When Schomberg halted, waiting for the arrival of artillery and provisions, the situation of the army is thus described by Leland—"His soldiers in a confined and unwholesome situation, in the midst of damps and winter showers, without sufficient food, fuel, or covering, an unfriendly climate and inclement season, soon weakened the whole army by fluxes, and a burning fever was caught from the garrison of Derry. The English, unaccustomed to severities, confined to a low and moist situation, drenched with perpetual showers, without the means of health, or the relief necessary in sickness, died daily, in great numbers."

When strong efforts were made for the removal of the sick of the army, to places

of safety, and of shelter, Leland informs us, that the general, at the age of four score, afflicted with the scene of wretchedness, exposed to the violence of a dreary and tempestuous season, stood for hours at the bridge of Dundalk, directing every means for alleviating the miseries of his men.

James's council of officers, before the battle of the Boyne, advised him to decline an engagement with the army of William, and to maintain a defensive war, as the one most likely to destroy men in an unfriendly climate, in want of provisions, and succours.—*Leland's History of Ireland.*

The sickness of the English army, corroborates the statement of Campion who, when writing of the island at a previous period, said that persons newly arrived, were particularly liable to be affected with bowel complaints.

The comparison which Cox made between the winters and summers of England and Ireland, agrees with that which has been given to us by Doctor Rutty.—*Natural History of the County of Dublin, Vol. II. p.* 469.

In the Pacata Hibernia, we find by a letter, dated August 1602, the Lord President giving his opinion against ever undertaking a winter siege in Ireland, "for Kingsale was bought at so dear a rate, as while I live, I will protest against a winter siege, if it may be avoided."—*Pacat. Hiber. p.* 631.

In the reign of William III. at the siege of Kinsale, as it is now called, the army suffered from the weather. The garrison surrendered upon conditions which would not have been granted, but that the weather was very bad, provisions scarce, and the army very sickly.—*Smith's History of the County of Cork, Vol. II. p.* 210.

It is difficult to ascertain the precise condition of the weather in distant periods, the invention of the thermometer, by Sanctorio, being comparatively of modern date; and a long time elapsed before the instrument was reduced to a correct standard by Fahrenheit Great allowance must be made for the accounts in old chronicles, and it is possible that extraordinary years happened, accounts of which have not been handed down to posterity in Irish, or continental annals.

In the Philosophical Magazine for 1820, Vol LV. is given a list of extraordinary years for a long period, chiefly from a work by Pilgram, in the German language, published at Vienna, in 1788.

This list of years is valuable, as it shows the occasional return of very severe winters in modern times, and may be used as an answer-to those persons who would attempt to prove, by quotations from the classics, the greater cold of Europe in the time of the Roman dominion; it is also valuable, as it proves that one of the coldest years recorded in the Annals of Ulster, arose from a general cause, by which the great rivers of Europe were frozen so hard as to bear waggons for a month.

A. D. 401. The Black Sea was entirely frozen over.

462 The Danube was frozen, so that an army marched over the ice.

545 The cold was intense.

763!! The Black Sea, and the Straits of the Dardanelles, were frozen over.

800 The winter was intensely cold.

822!! The great rivers of Europe such as the Danube, the Elbe, and the Seine, *were frozen so hard as to bear heavy waggons for a month.*

860 The Adriatic was frozen.

874 Snow from the beginning of November to the end of March.

In 991 The vines were killed by the frost; and again in 993, cattle perished in their stalls.

1067 The cold was so intense that travellers in Germany were frozen to death on the roads.

1124 The winter was uncommonly severe.

1133!! In Italy, the Po was frozen from Cremona to the sea, the snow rendered the roads impassable, and wine casks were burst by the frost.

1179 In Austria the snow lay on the ground until Easter, and the crops failed.

1216!! The Po was frozen fifteen ells deep, and wine burst the casks.

1234!! The Po was again frozen, and loaded waggons crossed the Adriatic to Venice.

1236 The Danube was frozen to the bottom.

1261 The frost was intense in Scotland, and the Cattegat at Jutland, was frozen over.

1281 A vast quantity of snow fell in Austria.

1292 The Rhine was frozen over at Brisach, and bore loaded waggons.

1323 The winter was so severe that both horse and foot passengers crossed on the ice from Denmark to Dantzic.

1344!! All the rivers in Italy were frozen over.

1392 The vineyards and orchards were destroyed by frost and the trees torn to pieces.

1408 One of the coldest winters ever remembered. Not only the Danube was frozen over, but the sea between Norway and Denmark, so that wolves driven from their forests, came over the ice into Jutland. In France the vineyards and orchards were destroyed.

1423 Travellers passed on foot from Lubec to Dantzic, on the ice.

The successive winters of 1432–1433–1434 were uncommonly severe. All the rivers in Germany were frozen over.

1460 Horse and foot passengers crossed the ice from Denmark to Sweden, and the vineyards in Germany were destroyed.

1468 The winter was so severe in Flanders, that wine was cut in pieces with hatchets.

1544 The same thing happened again, the wine being frozen into solid lumps.

1548 Between Denmark and Rostock, sledges drawn by horses, travelled over the ice.

In 1564 and in 1565, the Scheld was frozen so as to support loaded waggons.

1571!! All the rivers in France were covered with ice, and fruit trees, even in Languedoc, were killed by the frost.

1594 The Rhine and the Scheld were frozen, and even the sea at Venice.

1608 The snow lay of an immense depth even at Padua.

In 1621 and 1622!! All the rivers of Europe were frozen, and even the Zuyder Zee, a sheet of ice covered the Hellespont, and the Venetian fleet was choaked up in the Adriatic.

1655 The winter was very severe.

The winters of 1658, 1659, 1660!! were intensely cold. *The rivers in Italy bore heavy carriages*, and so much snow had not fallen at Rome for several centuries. It was in 1658, Charles X. of Sweden, crossed the Little Belt, over the ice into Denmark, with his whole army.

1670 In Denmark, both the Little and Great Belt were frozen over.

1684 The winter was excessively cold, even oak trees in England were split by the frost, and coaches were driven along the Thames.

1691 The cold was so excessive, that the wolves entered Vienna, and attacked the men and cattle.

1695 The frost in Germany began in October, and continued until April; many persons were frozen to death.

The years 1697 and 1699, were nearly as cold.

In 1709!!! occurred the famous winter called by distinction the cold winter. In the south of France the olive plantations were almost entirely destroyed. The Adriatic was quite frozen over, and the citron and orange groves suffered in the finest parts of Italy.

1716 On the Thames booths were erected, and fairs held.

1726 People travelled from Copenhagen to Scania, in Sweden.

1729 Much injury done by the frost in Scotland, multitudes of cattle buried in the snow.

The successive winters of 1731—1732 were extremely cold.

1740!! The cold was scarcely inferior to that of 1709, the snow lay on the ground eight or ten feet deep in Spain and Portugal, and the Zuder Zee was frozen over.

1744 The winter was again very cold, the Mayne was covered with ice seven weeks.

The winters during the five successive years 1745–1746–1747–1748–1749, were all of them very cold.

In 1754 and again in 1755, the winters were particularly cold.

In England strong ale exposed to the air, in a quarter of an hour, was covered with a film of ice.

The winters of 1766–1767–1768, were very cold all over Europe.

In France the thermometer fell six degrees below the zero of Fahrenheit's scale. The thermometer laid on the snow at Glasgow, fell two degrees below zero.

1771 The Elbe was frozen to the bottom.

1776 The Danube was frozen that it had ice five feet thick below Vienna. Wine was frozen in the cellars in France.

The successive winters of 1784 and 1785, were so severe, that the Little Belt was frozen over.

In 1789 The cold was excessive, and again in 1795, when the republican armies overran Holland.

The successive winters of 1799 and 1800, were both very cold.

In 1809, and again in 1812, the winters were remarkably cold.

The following list is of years, the summers of which were remarkable for being hot and dry, from the same work, (the Philosophical Magazine, Vol. *55* :)

A.D.	A.D.	A.D.	A.D.	A.D.	A.D.	A.D.	A.D.	A.D.
763	—1000	—1171			—1473	—1556	—1646	—1718
860	—1022	—1232	—1293	1333	—1474	—1615	—1652	—1723
993	1130	—1260	—1294	1393	1538	—1616	—1660	—1724
994	1159	—1276	1303	1394	1539			
		—1277	1304		1540			
					1541			

1745	—1754	—1763	—1779
1746	—1760	1774	—1788
1748	—1761	1778	—1811

As a succession of severe winters and of hot summers, have occasionally occurred, it is no wonder that an opinion of change of climate should have prevailed at different times.

In the time of the Hon. Robert Boyle, it was supposed, that the climate of Russia had changed. Boyle says in his Treatise on Cold—" The Czar's physician tells me by letter, that the winter he spent at Vologda, proved much less severe than usual, for as it happened, they had not three days of what they there call winter weather. He adds, that the cold which is thought to be excessive, hath been rare of late years, for some English who have lived upon the spot thirty years declare, that during their time, winters are become so mild, that the extreme cold which used to freeze people on the road in several postures, hath not been felt as formerly."—*Shaw's Edition of Boyle's Works, Vol. I. p.* 661.

Bonaparte, if he were alive, would not be very much inclined to subscribe to the doctrine of a change of climate in Russia.

In Lowthorp's Abridgment of the Philosophical Transactions, Vol. II. p. 42, we have a paper on the alteration of the climate of Ireland. It tends to show that the idea of change of climate has not been confined to modern days, and that a succession of favourable years has led to the belief of a change. The writer observes, " every

one almost begins to take notice that this country becomes every year more and more temperate."

"It was not unusual to have frosts and deep snows of a fortnight and three weeks continuance, and that twice or thrice, sometimes oftener in a winter; nay, we have had great rivers and lakes frozen all over, whereas of late, especially these two or three years last past, we have had scarce any frost or snow at all. Neither can I impute this extraordinary alteration to any fortuitous circumstances, because it is manifest that it hath succeeded gradually, every year becoming more temperate than the year preceding.—This winter 1675, I have kept an exact account of wind and weather. To transcribe my journal here, would be too tedious, let it suffice therefore to tell, that it hath been a very fair and warm, or rather no winter at all."

The language used in 1675 is very like that of Hamilton in his Memoir on the Climate of Ireland.

In Rutty's time, complaints of the inversion of the seasons were common—"wicked exclamations we hear against the inclemency of the climate, our changeable, and particularly our moist and windy weather, *an inversion of the seasons, &c.*, which are owing to a want of due attention to this branch of natural history, for those changes are common to us."—*Natural History of the County of Dublin, Vol. II. p.* 281.

The writer in 1675, described the prevalence of south and west winds, and stated that persons sometimes had to wait three months for a fair wind to come to Ireland. He gives the usual height of the barometer in Ireland as at "29 inches 4 tenths."

Though our climate is variable, yet in its chief leading features its history shows it to be the same. It is well known to us all, that September and October are generally agreeable months; Rutty, in describing this time of the year, calls it *our little summer.*" *Ibid, p.* 465.

Doctor Boate says—"In the latter end of autumn, weather is commonly fair again, for some weeks together, in the same manner as in the spring, but not so long, which as it doth serve for to dry up and to get in the corn, hay which till then hath remained in the fields, the too much wet having hindered it from being brought away sooner; so it giveth the opportunity of ploughing the ground, and sowing the winter corn, the which otherwise would very hardly be done. For that season being once passed, you have very little dry weather the rest of the autumn, and during all the winter."

Boate speaks of thunder being of rare occurrence in Ireland, and says when it does happen, it is in the summer season.

In the reign of Elizabeth, at the siege of Kinsale, there was thunder in December "to the wonder of all men, considering the season of the year."—*Pacat. Hiber.*

In speaking of dry summers, Boate observes—"But as winters cruelly cold, so likewise over dry summers do in this island hardly come once in an age, and it is a common saying in Ireland, that the very driest summers never hurt the land: for although the corn and grass upon the high and dry grounds may get harm, nevertheless

the country in general gets more good, than hurt by it; and when any dearths fall out to be in Ireland, they are not caused through immoderate heat and drought as in most other countries, but through too much wet and excessive rain."

In 1826 a famine was apprehended in Ireland, yet the potatoe crop turned out much better than could be expected after so very dry a summer.

In the Phil. Trans. No. 220, there is an account of a substance resembling butter, noticed in Ireland in November, 1695. A similar substance was remarked on grass in the autumn of 1826. The country people employed it to grease the wheels of carts.

Boate remarked, that often in Ireland after days of rain, the nights were fair and clear; the writer of this essay has frequently made a similar observation.

The researches of Doctor Wells explain the formation of dew; the cloudy sky of Ireland interferes with radiation, and is one of the chief causes of the mild temperature of our nights. Boate fell into an error, when he stated that there was as much dew in Ireland as there was in hotter and drier countries; but he may be refuted by his own words—" It is found ordinarily, that in a clear night following rain, the which is very ordinary, the dew cometh as liberally, as if it had not rained the day before." But the nights in Ireland are not in general so clear as the nights in drier countries; and Boate remarked that before rain, little or no dew was to be found, and he described the climate as subject to rain, therefore the formation of dew must have been frequently interfered with. His words are—" When it is towards any great rain, little or no dew doth fall." In another part he observes—" We have show th how much Ireland is subject to rain, and it is likewise to dark weather and overcasting of the air, even when it raineth not, which continueth sometimes many days together, especially in winter time."

In Kirwan's work on the Temperature of Different Latitudes, under the head of Stockholm, we are informed that Wargentin, in examining a series of 39 years, could not find that any one year resembled another. When a person examines the details of the years such as they are registered in Ireland, he sees such a variation, that he must be convinced of the folly of attempting to draw precise conclusions, unless he had a series of accurate observations made in the same place for a very long period. Thus if the seasons go through a cycle of fifty-four years, he should have observations for 108 years, to be able to compare two cycles.

Mr. Howard, in treating of the mean temperature of London, observes: " The mean temperature of the year is found to vary in different years to the extent of full four and a half degrees, and this variation is periodical. The extent of the periods for want of a sufficient number of years of accurate observations cannot at present be fully determined, but they have the appearance of being completed in seventeen years."

He ventured to make predictions of some succeeding years, and he has failed.

Let us hear a prediction from him—"The year 1816 which was the coldest of a cycle, appears to have had its parallels in 1799 and 1782, and there is every reason to conclude from present appearances, that the warm temperature of 1806 will reappear in 1823."—*Howard on the Climate of London, Vol. II. p.* 289.

Let us now see the character of the year 1823 in the Philosophical Magazine, Vol. LXIII, p. 77—"The mean annual temperature fully confirms what has been before advanced, that wet summers are generally cold. The whole of the monthly means, with the exception of May and December, are unusually low, indeed the actual deficiency as to the annual amount exceeds $2\frac{1}{2}$ degrees." Howard predicted also that the year 1821 would prove an extremely dry one.—*Climate of London, Vol. II. p.* 294.

Dr. Burney describes the ground in 1821 to be in a very moist state.—*Phil. Mag. Vol. LIX. p.* 278.

The failure of such a man as Howard in predicting a year, is the best possible proof of the variableness of the climate of the British isles.

Kirwan endeavoured to form rules of prognostication from the observations of Rutty. In describing the year 1792, in the 5th Vol. of the Transactions of the Royal Irish Academy, he admits that the autumn turned out wet, the least probable event. The autumn of 1794 turning out wet, he admits to be contrary to the rules of prognostication.—*Trans. Roy. Irish Acad. Vol. VI. p.* 171.

It would not be an easy matter to draw up rules, or to talk dogmatically on the minute details of the weather from the scanty materials we have in Ireland. In the diary of the weather for the year 1802 in the Transactions of the Dublin Society for 1803, we are informed that "the thermometer is noted at 8 morning, 12 noon, till the month of May. Then it is noted at 8 morning, 12 noon, and 4 afternoon, the remainder of the year. In some instances it is noted at 8 morning, 12 noon, 4 afternoon, 8 at night, *and at other hours.*" In the diary of the weather for the year 1806, we are informed in the same work that "the thermometer is noted at noon, and four o'clock, and occasionally at other times." Can any thing be more vague than this?

In noticing some difference in the mean temperature of some years in Dublin, or in other parts of Ireland, we are not to conclude that a change of climate has taken place; the mean temperature of London, according to Howard, varies to the extent of four and a half degrees, therefore the mean temperature in Ireland ought to vary also. The same reasoning will hold good with regard to the quantity of rain in different years.

Doctor Patterson's work on the climate of Ireland,* is evidently for the purpose of combating the opinion of Hamilton in the Transactions of the Royal Irish Academy, that trees fail now in situations where they once flourished, owing to a change of

* Observations on the Climate of Ireland, by William Patterson, M. D. Dublin, 1804.

climate. But as it has been well shown, allowance has not been made for the shelter afforded by large trees.

In a long course of time, young trees may gradually extend up the sides of mountains, protected from the wind by the older and higher trees, until at length they may crown the very summits.

Patterson might have also easily refuted the opinion of Hamilton, by showing from Irish history, that in former times mountains were not the places remarkable for the growth of timber.

To establish this point, is a matter of some importance; if it can be satisfactorily proved, it will tend to overthrow the doctrine of Hamilton, with regard to a change of climate.

Jocelin, in his life of St. Patrick, makes the distinction between woods and mountains,

"For he abode in the mountains, and in the woods."

Swift's Jocelin, Chap. XIII.

Cambrensis describes the mountains for the pasturing of cattle:

"Frugibus arva pecori montes."

Spencer informs us of the Irish holding meetings on the mountains. He says, speaking of the Irish—"There is one use amongst them, to keep their cattle and to live themselves the most part of the year in boolies, pasturing upon the mountain and waste wild places, and removing still to fresh land as they have depastured the former."

In another place he observes thus—"Yet it is very behoofeful in this country of Ireland, where there are great mountains and waste deserts full of grass, that the same should be eaten down and nourish many thousands of cattle for the good of the whole realm."

The distinction between woods and mountains, is of frequent occurrence in accounts of Irish warfare.

In Ware's Annals, we have an account given of a disaster, which befel the forces of Lord Grey in the county of Wicklow, in the reign of Elizabeth—"Marched with a good force to attack, and ordered his foot to enter into the woods, whilst he with the horse remained on the mountains hard by."—*Ware's Annals.*

Here the distinction between woods and mountains, is well marked; the mountains on which cavalry could manœuvre, agree with the account Spencer has given of the mountains fitted for the pasturing of cattle.

Sir John Davis, in his book to explain the reason why Ireland was never entirely subdued until the reign of James I. says that the English settlers erected their castles and habitations in the plains and open countries, and forced the Irish into the woods and mountains. Again he observes:

"The over large grants of land and liberties to the English, the plantations made

by the English in the plains and open countries, leaving the *woods and mountains* to the Irish, were great defects in the civil policy, and hindered the perfection of the conquest very much."—*Sir J. Davis, Quarto Edition, p. 36.*

In 1586, when Sir Richard Bingham marched to put down an insurrection of the Burks, the distinction is made between the mountains and the woods, thus—"he immediately marched to the Abbey of Balintubber, from whence he sent his foot and kerns into the mountains and woods."—*Ware's Annals.*

In the Pacata Hibernia, Desmond is described as being a desolate country—"the whole country being nothing else but mountains, woods, and bogs."—*Pacat. Hiber. p. 538.*

Patterson has given plenty of instances of the growth of trees in exposed and high situations in modern times. Templeton, in the 8th Vol. Transactions of the Royal Irish Academy, says—"The Laurustinus is one of those plants that were introduced to Ireland before green houses were known, consequently planted in the open ground, and experience shows that it is seldom hurt by frost."

In the same volume he also states, that at Fair Head, the northern extremity of Ireland, the mountain ash, birch, and oak, grow luxuriantly within fifteen or twenty yards of high water mark.

In the 4th number of the Dublin Philosophical Journal, there is an account given of a number of plants naturalized under the climate of Ireland, by James Townsend Mackay. It would take up too much space to enumerate them, but the paper shows the great mildness of our climate, and proves that it is not becoming more ungenial, as a person might be led to think by reading Hamilton's Memoir on the Climate of Ireland. It is not to be supposed that the great mildness of our winters is of any recent origin, although it has been promoted by draining and cultivation.

Patterson, in describing the celebrated Arbutus at Mount Kennedy, states that in 1773, its age then exceeded one hundred years.

Some suppose that the arbutus which grows in such abundance at Killarney, was introduced by the Spaniards in the reign of Elizabeth. It was probably introduced by the monks at a much earlier period. Smith, in describing Innisfallen in the Lake of Killarney, says—"There are besides timber trees, the remains of several fruit trees, as plums, pears, &c. which have outlived the desolation that hath seized on the cells of those recluses who first planted them."

There can be little doubt but that apple trees were cultivated in Ireland, before the time of Henry II. An apple tree is mentioned in the life of St. Columba. The story of St. Kevin and the apples may be cited; but one of the most authentic documents we have relating to Ireland, St. Bernard's Life of Malachy, proves that there were apples in Ireland—

"Accelera inquit fer illi tria poma."

Vita Malac. cap. 23.

The account which Mela has given of the vegetation in the island, although exaggerated, yet it has a tendency to prove the moist and mild nature of the climate in his time. He states that the climate is unfit to bring grain to maturity, and that cattle, if not restrained from feeding, would be in danger of bursting from the luxuriant herbage.—*Mela, Lib.* 3. *c.* 6.

Some agriculturists maintain now, that corn is liable to degenerate in this moist climate, and they advise the importation of seed corn from a more congenial country. Cattle have been often injured by feeding on clover. Spencer says, speaking of corn in Ireland—"as for corn, it is nothing natural, save only for barley and oats, and some places for rye." Arthur Young, in modern times, gives a decided preference to English grain in comparison to Irish.

Petrus Lombardus imagined that the vine could be cultivated with success in Ireland; this ought to be looked on as a speculation, probably encouraged by a succession of favourable seasons about the period in which he wrote. He was an ecclesiastic who had spent a good deal of his time on the continent. Let us hear Camden on the subject of Ireland. "It has also vines, but more *for shade* than fruit, for when the sun quits Leo, cool breezes ensue in this our climate, and the afternoon heats in autumn, are too weak and short both here, and in Britain, to bring grapes to perfection."—*Gough's Camden.*

In an Irish almanack of the fourteenth century, the time of gathering grapes and of drinking new made wine, is pointed out.—*Anthol. Hiber. Vol. I. p.* 130.

This ought to be looked on in the light of a modern gardener's book. Although directions may be given in such a book how to cultivate the fig tree, we would not be led to suppose that the climate was fitted for it; yet in 1826, in the south of Ireland, figs in some favourable situations, came to perfection in the open air.

There is an ancient canon which imposes penalties on the owners of hens that damage vines.—*Dacherii Spicil, tom.* ix. *p.* 46.

Ecclesiastical communities might have raised vines for shade and ornament as at present, or for making verjuice.

It has been supposed that yew trees did not abound in Ireland in the middle ages, from an act being passed to oblige merchants to import bows. This may be accounted for; the Irish probably destroyed the yew tree wherever they met it, for two reasons, first, because it was poisonous to their cattle, secondly, because it afforded their enemies a destructive weapon.

Although Patterson has, in his treatise on the Climate of Ireland, refuted Hamilton, yet he has propagated an error relating to the quantity of rain in Ireland. He supposed that more rain fell in England, than in Ireland, and he has led others into the same mistake. We find in the Encyclopædia Metropolitana article, Ireland, the following:

"It is probable that the quantity of rain which falls annually in Ireland, is less than

that which falls in England ; but it is evidently impossible to arrive at certain results on this question, from the partial observations hitherto made on local climates." The writer of this essay has no hesitation in saying, that Patterson and his followers are wrong. The great quantity of rain that falls at Kendal, from its peculiar locality, deceived him as to the average quantity of rain in England and Scotland.

Dr. Campbell of Lancaster, observes, that the influence of hills in attracting clouds is no where more conspicuous, than at Kendal; that one third more rain falls at Kendal, than at Lancaster, a distance of only twenty miles, and that it is by no means unusual, to see from the church-yard of Lancaster, the hills about Kendal envolved in thick clouds, while the sky at the Lancaster side of Farlton Knott, appears perfectly clear.—*Memoirs of the Lit. and Phil. Soc. of Manchester, Vol. IV. part 2, p.* 635.

Dr. Campbell informs us in the same work, that the clouds from the South and South-west, are attracted by the hills which divide Yorkshire from Westmorland, and that while the western side of these hills is deluged with rain, frequently on the Yorkshire side, the weather is dry. Doctor Garnett says—" The summer of 1792 was remarkably dry in Yorkshire, and all the eastern side of the English Appenine was burnt up for want of rain, while on the western they had plenty of rain and abundant crops of grass."—*Ibid. p.* 634.

Doctor Patterson should have had observations made on the western side of the high grounds in the centre of Ireland, or at a remarkably rainy spot, such as Killarney, to institute a comparison with the very moist part of England.

No person, a priori, would suppose that more rain could fall in England, than in Ireland. In the first place, Ireland is nearer to the Atlantic, and in the second place, it has more mountains than England to attract clouds.

Long since, Boate remarked, that no country in the world was fuller of brooks than Ireland. The number of rivers, is the best proof of greater humidity. The high grounds in the centre of the island, arrest the clouds loaded with moisture, which did not deposit their burthen on the western coast; hence the magnificent Shannon, swelled by tributary streams, rolls its vast volume of water to the ocean.

Any person may point to the Shannon, and laugh at meteorological registries; here is the hygrometer of nature which does not err, in pointing out the greater humidity of Ireland. We have in the Derry Survey as follows :

" Taking the annual quantity of rain that falls in the east of England, which rarely is less than 18 inches, and the max, of the west of that country, the average will exceed 51 inches, and we cannot suppose that Scotland would produce a lower result."

A comparison between the quantities of rain at Derry and Edinburgh, will show that Patterson was wrong.

From the Derry Survey, year		inches	From Brewster's Encyclop. article Scotland.	inches
1795	-	32-861		35-7
1796	-	25-718394	-	19-4
1797	-	30-821272	-	25-9
1798	-	33-2310176	-	23-9
1799	-	34-7709468	-	25-9

In one year the quantities were nearly alike in both places; in the other years, the rain at Derry far exceeded that of Edinburgh. The quantity of rain that fell at Glasgow, on an average of thirty years, is marked at 29 inches in the same work.—*Brewster's Encyclopædia.*

The average quantity of 51 inches, which Patterson attributed to England, is entirely too much.* Howard, in his work on the climate of London, states that the greatest quantity of rain during twenty-three years, fell in 1816 at London, and he gives the amount as being 32 inches. He gives the general average for a period of twenty years at 25-179 inches, and the means taken on the ground.—*Howard, Vol. II. p.* 185.

Wakefield quotes Doctor Young, to show, that the average quantity of rain for England and Wales is 31 inches.

The average quantity during eighteen years at Liverpool, which is not a very great distance from Kendal, was 34 inches.—*Memoirs of the Lit. and Phil. Society of Manchester, Vol. IV. part 2, p.* 575.

Arthur Young observes—"I have known gentlemen in Ireland deny their climate being moister than England; but if they have eyes let them open them, and see the verdure that clothes their rocks, and compare it with ours in England, where the rocky soils are of a russet brown, however sweet the feed for the sheep."

In another place he remarks—"If as much rain fell upon the clays of England, as falls upon the rocks of her sister island, those lands could not be cultivated."—*Tour in Ireland, Vol. II. p.* 74.

The prevalence of winds which waft vapours to the island, is from an early date. The prevailing winds in the time of Camden, were the same in the time of Cambrensis. Camden observes, that Giraldus said, not without reason—nature beheld the realm of zephyr, with an uncommonly favourable eye.

Solinus described the Irish sea as being stormy—"Mare quod Britanniam et Hiberniam interluit, undosum et inquietum toto in anno, non nisi aestivis pauculis diebus est navigabile, navigant autem vimineis alveis quos circumdant ambitione tergorum bubulinorum—*Solinus, c. 35.*

* Williams quotes Hales, who estimated the annual quantity of rain in England at 22 inches.—*Williams's Climate of Great Britain, p.* 79.

It may be said that it would be dangerous to cross the sea, in such craft at present. He qualified the description by the words " navigant autem."

Boate gives a passage from Giraldus on the Irish sea, but he does not give his meaning correctly in the translation—" Hibernicum mare, concurrentibus fluctibus undosissimum fere semper est, inquietum ita, ut vix etiam aestivo tempore, paucis diebus se navigantibus tranquillum prœbeat."

Boate translates this passage thus—" The Irish sea being very boisterous through the concourse of the waves, is almost always restless, so as even in the summer time, it is hardly for a few days quiet enough to be sailed on."

Surely this is not the meaning of Cambrensis. His meaning in this passage is, that scarcely in the summer time, is it calm for a few days.

A perfect calm is not a frequent occurrence at the present day in the Irish sea.

Boate, speaking of the want of east wind to bring ships from England, to Ireland, observes—" But in the summer time, and chiefly in the spring, and in the months of March, April, and May, one is not so much subject to that incommodity, as in the other times of the year."

Boate's observations agree with these of Rutty.

It would be difficult from the natural history of Ireland, at least during the historical period, to prove a change of climate; wolves have been exterminated, the employment of guns has tended to banish birds from countries more than any change of climate.

In the list of birds by Cambrensis, are to be found cygni. Smith informs us that wild swans were common in the north of Ireland, but were only observed in the south in the great frost of 1739.

Wild swans were shot in the south of Ireland, in the winter of 1829.

It is allowed that magpies were driven here by a storm, at a period subsequent to Cambrensis, but many birds might have escaped his observation. The increase of population, and the use of fire-arms, no doubt, banished storks. They were in Ireland in the reign of Henry II. " We have seen," says the Irish king Dermot, in a letter preserved by Cambrensis, " the storks and the swallows. The birds of the spring have paid us their annual visit, and at the warning of the blast, have departed to other climes. But our best friend has hitherto disappointed our hopes. Neither the breezes of the summer, nor the storms of winter, have conducted him to these shores."—*Lingard's History of England.*

Ireland, in ancient and modern times, is similar in being free from serpents

Spencer described the Irish as being tormented by gnats, in the woods. Arthur Young says that the number of flies which devour one in a wood, prove the great humidity of Ireland."—*Young's Tour in Ireland, Vol. II. p. 77.*

In every period of the history of the climate of Ireland, we find evidence of its mildness.

Sir John Davis in his time, stated as follows :—"During the time of my service in Ireland, I have visited all the provinces of that kingdom, in sundry journies and circuits, wherein I have observed the good temperature of the air, and the fruitfulness of the soil."

We find its character at different periods to agree with its character of the present day, if we except the title of 'glacialis Ierne,' given in poetic description; to this it has been shown, it never could have just claims.

Cambrensis says—"Pascuis tamen quam frugibus, gramine quam grano fœcundior est insula."

Wakefield observes, that in the south of Ireland, the value of the mountains of Tipperary, Cork, and Kerry, was frequently mentioned to him, as the climate allowed them to be grazed throughout the whole year; a statement which agrees with the following—"sicut aestivo, sic hiemali tempore, herbosa virescunt pascua, unde nec ad pabula fœna secari nec armentis unquam stabula parari solent, aeris amœnitate temperieque, tempora fere cuncta tepescunt."

The woods have been cut down since the time of Cambrensis, with the exception of the woods; this description of the country may be received as applicable at the present day.

"Hibernia quidem terra inaequalis est, mollis, et aquosa, sylvestris, et paludosa."

The names of the letters in the Irish alphabet, show that a vegetation familiar to the present generation, was known to the inhabitants of the island, at a distant period.

Ledwich, on the authority of Lombard, says :—"About 1632, artichokes, colly-flowers, pompions, and hops, seem to have been first introduced and grew very well."

These vegetables growing in Ireland at that time, do not prove any change of climate, if they had been introduced at an earlier period, there is little doubt but that they would have succeeded as well. The same reasoning holds good for the tobacco, cultivated at present to such an extent in the county of Wexford.

In the Preface to the Translation of Dandolo, on the silk-worm, the writer states, that "during the last century, some French refugees in the south of Ireland, made considerable plantations of the mulberry, and had begun the cultivation of silk with every appearance of success; but since their removal, the trees have been cut down."

An attempt has been made of late years in the south of Ireland, to produce silk on the estate of the Earl of Kingston.

The following queries were transmitted to a person in the neighbourhood.

Have the mulberry plants thriven or died?

Have the silk worms died; the cause?

Are any attempts continued to rear plants or worms?

To which the following was received :—"The plants did not thrive, the silk worms died, the climate did not appear congenial. No attempts are now made, the ground has been let to tenants. Lord Kingston went to much expense, in this attempt to es-

tablish a silk factory; the first season it appeared to have gone on well, and it was imagined that it would have been successful; however, the following season came wet, and the worms perished."

A great deal depends on favourable seasons. In 1768, a bounty of twenty guineas was given to a Mrs. Gregg, for having raised a considerable quantity of silk in the county Clare.—*Transactions of Dublin Society for* 1799.

In the Pacata Hibernia, it is stated, that they were prevented from reaping in Kerry in the month of July, the crops being backward on account of an unfavourable season. Barley was much cultivated in Ireland at that time, the country was but thinly inhabited, and of course the best lands were selected for cultivation, and the computation of time was according to the old style. Arthur Young, in his tour in Ireland, describing the rotation of crops in the Mahagree islands, near Tralee, in the County Kerry, observes—"All grain is remarkably early, they have sown English barley, and made bread of the crop in six weeks. I was assured, that in these islands, they have known two crops of barley gained from the same land, in one year, and the second better than the first. They sowed the first in April, and reaped the middle of May, and immediately sowed a second, which they reaped the end of August."—*Vol. I. p.* 472.

It would be a desirable thing, if we had an exact account of the weather in the south of Ireland for a long time. There is no registry of the weather made at the Royal Cork Institution, on Sundays. When the writer of this essay visited that establishment, to compare the statements in Smith's History of the County Cork, with a considerable series of years in modern times; the officers of that establishment could not tell what was become of the registry, previous to the year 1825.

In Smith's time the rain was as follows in Cork:—In 1738, 54 inches 5 tenths—the same nearly in 1739—in 1740, but 21 inches 5 tenths—in 1741, 33 inches 6 tenths—in 1742, 38 inches 1 tenth—in 1743, 39 inches 3 tenths—in 1744, 33 inches 6 tenths—in 1745, 48 inches 4 tenths—in 1746, 30 inches; the same nearly in 1747—and in 1748, 37 inches 4 tenths.—*Smith's Cork, Vol. II. p.* 404.

The quantity of rain at the Royal Cork Institution, was in round numbers as follows:

years			inches
1825	-	-	32
1826	-	-	28
1827	-	-	31
1828	-	-	40
1829	-	-	39

Hamilton gives the mean temperature of different parts of the City of Cork in 1788, at 52—5 to 53—5.—*Transactions Royal Irish Academy, Vol. II.*

The mean temperature at the Royal Cork Institution on the average of five years

is about 55. This does not prove a change of climate; in the first place the average is swelled by the warm year of 1826, and the thermometer is kept in the centre of the city, in a situation surrounded by high buildings, where it must be affected by radiation. Howard has shown, that the mean temperature of London varies to the extent of $4\frac{1}{2}$ degrees in different years; therefore Hamilton was not warranted, in deducing the mean temperature of Ireland from the observations of a few years.

Smith's account of the winds in his day, agrees well enough with the average of five years in modern times in Cork. No precise conclusions can be drawn from comparisons between broken fragments of cycles of the weather.

Kirwan remarks—"Among all the years observed by Dr. Rutty from 1725 to 1765, there occurs but one similar to 1792, the year 1755, in that the three seasons, spring, summer, and autumn, were wet."—*Transactions of Royal Irish Academy, Vol. V. p.* 240.

It is a generally received opinion, that within the memory of our old peasants, the winters have become milder, and the summers less warm; in this essay it is contended for, that the general character of the climate has from a very early period been the same; yet it is certain that there is some good reason for this popular opinion, on account of a modification of the climate, from the general extension of the potatoe culture.

That the old people should imagine that the summers were warmer formerly, ought not to surprise us, as the buoyancy of youth, and warm blood in young days, cause a warm glow from moderate exercise; but, on account of the greater liability of old people, to be affected by cold, they ought to feel more severely now, winters of the same temperature. If no change has taken place, we should expect to hear from them complaints of the cold; but on the contrary, the old peasants maintain firmly, that the winters formerly were colder.

Popular and general opinion is not to be slightly passed over. The peasantry of France, obtained a signal triumph over the philosophers of their country, with regard to the fact of the fall of meteoric stones.

The potatoe culture has extended in almost every direction, even up to the tops of mountains in some places. *The paring and burning* of rough ground, makes it smooth, and allows the sun to exert its full influence along the surface in winter. On rough mountain ground, where there are inequalities, and tufts of heath, and furrows worn by the rain, snow in such places is liable to remain a long time undissolved. *Boate remarked in his time, that there was a greater plenty of snow on the mountains, than in other parts.*

In summer the shade of the stalks of potatoes protect the ground from the sun, and the trenches, which might serve in winter as fit receptacles for keeping snow undissolved a considerable time, are obliterated by the digging out of the potatoe crop, on the approach of severe weather. If the trenches remained during the winter, it is

evident that after a fall of snow, some of it would lie a considerable time undissolved in these trenches.

The appearance of frost is a signal for the Irish peasant to dig out his potatoes, and consequently to obliterate the trenches. The level dark-coloured ground, which remains after the potatoe crop, is well adapted for melting snow. The sun exerts its influence to great advantage *on a dark surface*, according to the experiments of Franklin; and at night, fallow ground of this description, is, according to the experiments of Dr. Wells, particularly unfavourable for the production of *hoar frost.* Thus modern science is in favour of popular opinion.

The potatoe culture shades the ground in summer also, in the following manner: A number of the hills of Ireland lie east and west; the potatoe trenches, which are so many drains, run at right angles to the tops of these hills, for the purpose of conveying off superfluous water; the rays of the sun from east to west do not therefore traverse directly these trenches, and thus the beds, independently of the stalks, cause a shade. In this way a great portion of the surface of Ireland is shaded in summer, but particularly by the luxuriant stalks of potatoes, that meet the eye of the traveller in every direction.

The potatoe culture has also wonderfully increased the number of enclosures, and hedge rows, and has consequently added to the shading of the ground in summer, in every direction, even up to the tops of mountains. Hedge rows also afford shelter to cattle in winter. Smith, in his History of Kerry, stated that cattle in his time sometimes perished on the mountains in severe winters.

Before the general cultivation of the potatoe for the food of the people, (in the recollection of many, oaten bread constituted a considerable portion of their diet,) large tracts of pasture ground denuded of timber, and not intersected by hedges, must have been liable to be parched in summer. The bed and trench plan of culture, the favourite system with our peasantry, is admirably adapted for draining this moist island, and for mixing clay with a peaty surface.

In winter, bogs and shallow pools, were easily frozen at night, and served as reservoirs of cold on the following day. According to the experiments of Doctor Wells, grass is particularly liable to be covered with *dew and hoar frost.* The extensive system of pasture formerly followed in Ireland, must have often presented a large surface of hoar frost to the action of the morning's sun.

A considerable portion of the heat of the morning's sun must have been therefore expended, in thawing the ice on shallow pools, and in bogs, and in melting the hoar frost, formed on the grass during the night.

If, notwithstanding the draining of swamps, the reclaiming of bogs, and the amelioration of the soil by manures, and by more judicious cultivation, it should be contended, that on an average of years, the winters at present are exactly as cold as they were previous to the general cultivation of the potatoe; it would imply, that the

power of the sun was then greater than it is at present, as it had then more obstacles to overcome in warming the surface of the island.

The vast quantity of manured fallow ground, of *a colour dark* in proportion as it is not exhausted by severe cropping, now materially aids the sun, to warm the surface of Ireland in the winter. It is well known, that the exhausting of ground by repeated corn crops, causes its colour to become lighter. This injudicious system, was much more practised formerly, than at present. Landlords everywhere endeavour to prevent it. The old country people are positive in asserting, that the snow lay longer on the ground when they were young, than it now is observed to remain.

If, notwithstanding luxuriant crops from an improved soil, and the shading of the surface by the general cultivation of the potatoe, and by the number of hedge rows, it should be contended, that on an average of years, the summers now are *exactly* as warm as they were formerly, it would imply, that the power of the sun's rays is greater for warming the island now, as its surface is better shaded than it was in the period subsequent to the destruction of the woods.

The greater power in the rays of the sun, on an average of years cannot be admitted, as there is no evidence to prove it; and the occasional return of very hot summers, and of very severe winters, is attributed to causes at present not perfectly understood.

If this reasoning be allowed, it must be admitted, that the modification of climate must have kept pace with agricultural improvement, on an average of years, and it explains, and corroborates popular opinion on the subject.

The vast increase of the potatoe culture, and the general use of this vegetable as the entire dependence of the peasantry, have been within the memory of the old persons of the present generation; therefore it is just to believe, that a modification of climate from local causes, has taken place within their recollection.

The general character of the climate has been the same from a very early period; hot summers, and cold winters arise from *general*, not from local causes; but when they do happen, the temperature must be influenced by the state of the surface in some degree.

The testimony of the peasantry, that the snow does not remain now so long on the ground as formerly, must be received. The experience of old sportsmen, who had been in the habit of traversing tracts of country now reclaimed, corroborates the evidence.

In Rutty's time, the cultivation of the potatoe was making progress on the rough grounds, in the county Dublin; he admits that his account of frost and snow in the city of Dublin, was too little when compared with *the accounts of country parts.*

On account of the scanty state of data on the weather in Ireland, it is impossible to put popular opinion to a severe test, by scientific records.

In fact if it be true, as was supposed by Lord Bacon in his time, and as is imagined by Howard and others, that the seasons go through a cycle, it is evident that we

should have the weather accurately observed during two complete cycles, one at a late, another at a distant period, so as to be able to compare them, before we would be warranted in attempting to draw precise conclusions.

The potatoe culture is well fitted for draining the moist surface of the island, the trenches run from the summits of the hills to carry off superfluous water.

Not only have bogs been reclaimed, but in some districts they have been absolutely removed, and the peat which they afforded consumed as fuel. In some places, a bog is the most valuable part of an estate, where fuel is dear. Great masses, therefore, of this *vegetable sponge*, retentive of moisture, and liable to be quickly frozen, have been removed or reclaimed, and mixed with clay in the recollection of our peasantry. These places must have been fertile sources of vapour; and in time of frost, when once frozen, they must have been magazines of cold for a considerable time.

We have the testimony of Sir James Ware, of Boate, and of Cox, that good effects on the climate from cultivation, were experienced in Ireland when they lived; then why should we reject the testimony of the old peasants who are yet alive, particularly when it is consistent with science?

Smith, in his History of the County of Kerry, predicted that the culture of potatoes would render the country more wholesome, and stated that enclosures sheltered the land, and improved it, and kept it warm in winter.—*Smith's Kerry, p.* 159.

The process of adding calcareous, vegetable, and animal manures to the soil is constantly going on in Ireland, year after year. Sir H. Davy ascertained by experiment, that a dark-coloured soil, containing animal or vegetable matter, if heated within the common limits of solar heat, will cool more slowly, than a wet pale soil, composed entirely of earthy matter. Therefore it is what ought to be expected, that snow should not remain on the ground now, so long as formerly.—*Agricul. Chemis. p.* 156.

The few observations made with instruments in Ireland, have been made in towns, not in the country parts. Towns are not the fit places for observations; the heat from fires, the number of inhabitants and of domestic animals crowded together, the friction of vehicles and of machinery, the dark colour of the streets from animal and vegetable manures, the process of fermentation going on, all these matters tend to raise the temperature of towns.

Registries of the weather, kept for a very long period, and in country parts, only could disprove popular opinion on the subject of snow remaining on the ground.

The observations should be made with *great care*, and for an extended series of years.

We have the authority of Howard for thinking, that implicit reliance is not to be placed on the registry, even of the Royal Society of London.—*Howard on the climate of London, Vol. II. p.* 190.

The name of mountain ground is frequently given in Ireland, to rough grounds producing heath, and such kind of vegetation of little value. In such places, not

only in the time of Boate, but also in the recollection of our own country people, snow, when it fell, was apt to remain a considerable time. The inequalities on such ground, protect the snow from the rays of the sun.

By *paring and burning*, lands of this description are every year brought into cultivation.

The history of the weather in Ireland shows its general mild and moist nature, what might be expected from the island's locality, in regard to the Atlantic. The vapours of this ocean produce frequent rain ; this produces rivers and verdure.

Well may Ireland be called—

> Land of brooks, and murmuring streams
> Of rivers wide, and verdant plains.

Sir James Ware, in his Antiquities of Ireland, quotes the following character of the island from Alexander Nechamus.

> " Fluminibus magnis lætatur Hibernia."

Spencer, in his Fairy Queen, has described our rivers.

> " There was the Liffie rolling down the lea,
> The sandy Slane, the stony Au-brian
> The spacious Shenan spreading like a sea,
> The pleasant Boyne, the fishy fruitful Ban,"

The general character of humidity and mildness of our climate, cannot be disproved by details of portions of cycles. The same causes always produced the same effects. Ireland in every age excelled other countries in mildness of climate and in verdure.